

# Component-based Product Line Engineering with UML

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# Component Based Product Line Engineering With Uml

**Colin Atkinson**



## **Component Based Product Line Engineering With Uml:**

*Component-based Product Line Engineering with UML* Colin Atkinson,2002 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 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 Architecture** Ivica Crnkovic,Volker Gruhn,Matthias Book,2011-09-15 This book constitutes the refereed proceedings of the 5th European Conference on Software Architecture ECSA 2011 held in Essen Germany in September 2011 The 13 revised full papers presented together with 24 emerging research papers and 7 research challenge poster papers were carefully reviewed and selected from over 100 submissions The papers are organized in topical sections on requirements and software architectures software architecture components and compositions quality attributes and software architectures software product line architectures architectural models patterns and styles short papers process and management of architectural decisions software architecture run time aspects ADLs and metamodels and services and software architectures Objects, Components, Architectures, Services, and Applications for a Networked World Mehmet Aksit,Mira Mezini,2003-02-25 This book constitutes the thoroughly refereed post proceedings of the international conference NetObjectDays 2002 held in Erfurt Germany in October 2002 The 26 revised full papers presented were carefully selected during two rounds of reviewing and revision The papers are organized in topical sections on embedded and distributed systems components and MDA Java technology Web services aspect oriented software design agents and mobility software product lines synchronization testing refactoring and CASE tools **Reuse of Off-the-Shelf Components** Maurizio Morisio,2006-07-25 This book constitutes the refereed

proceedings of the 9th International Conference on Software Reuse ICSR 2006 held in Torino Italy in June 2006 The book presents 27 revised full papers and 13 revised short papers carefully reviewed and selected from numerous submissions The Coverage includes COTS selection and integration product lines domain analysis and variability reengineering maintenance programming languages and retrieval aspect oriented software development approaches and models and components

**Applied Software Architecture** Christine Hofmeister, Robert Nord, Dilip Soni, 2000 Designing a large software system is an extremely complicated undertaking that requires juggling differing perspectives and differing goals and evaluating differing options Applied Software Architecture is the best book yet that gives guidance as to how to sort out and organize the conflicting pressures and produce a successful design Len Bass author of Software Architecture in Practice Quality software architecture design has always been important but in today's fast paced rapidly changing and complex development environment it is essential A solid well thought out design helps to manage complexity to resolve trade offs among conflicting requirements and in general to bring quality software to market in a more timely fashion Applied Software Architecture provides practical guidelines and techniques for producing quality software designs It gives an overview of software architecture basics and a detailed guide to architecture design tasks focusing on four fundamental views of architecture conceptual module execution and code Through four real life case studies this book reveals the insights and best practices of the most skilled software architects in designing software architecture These case studies written with the masters who created them demonstrate how the book's concepts and techniques are embodied in state of the art architecture design You will learn how to create designs flexible enough to incorporate tomorrow's technology use architecture as the basis for meeting performance modifiability reliability and safety requirements determine priorities among conflicting requirements and arrive at a successful solution and use software architecture to help integrate system components Anyone involved in software architecture will find this book a valuable compendium of best practices and an insightful look at the critical role of architecture in software development 0201325713B07092001

### **Software Reuse: Methods, Techniques, and Tools**

Cristina Gacek, 2003-08-01 As a result of the open source movement there is now a great deal of reusable software available in the public domain This offers significant functionality that commercial software vendors can use in their software projects Open source approaches to software development have illustrated that complex mission critical software can be developed by distributed teams of developers sharing a common goal Commercial software vendors have an opportunity to both learn from the open source community as well as leverage that knowledge for the benefit of its commercial clients Nonetheless the open source movement is a diverse collection of ideas knowledge techniques and solutions As a result it is far from clear how these approaches should be applied to commercial software engineering This paper has looked at many of the dimensions of the open source movement and provided an analysis of the different opportunities available to commercial software vendors

References and Notes 1 It can be argued that the open source community has produced really only two essential 9 products

Apache undeniably the most popular web server and Linux although both are essentially reincarnations of prior systems Both are also somewhat products of their times Apache filled a hole in the then emerging Web at a time no platform vendor really knew how to step in and Linux filled a hole in the fragmented Unix market colored by the community's general anger against Microsoft 2 Evans Marketing Services Linux Developers Survey Volume 1 March 2000 *Designing Software Product Lines with UML* Hassan Gomaa, 2005 *Designing Software Product Lines with UML* is well written informative and addresses a very important topic It is a valuable contribution to the literature in this area and offers practical guidance for software architects and engineers Alan Brown Distinguished Engineer Rational Software IBM Software Group Gomaa's process and UML extensions allow development teams to focus on feature oriented development and provide a basis for improving the level of reuse across multiple software development efforts This book will be valuable to any software development professional who needs to manage across projects and wants to focus on creating software that is consistent reusable and modular in nature Jeffrey S Hammond Group Marketing Manager Rational Software IBM Software Group This book brings together a good range of concepts for understanding software product lines and provides an organized method for developing product lines using object oriented techniques with the UML Once again Hassan has done an excellent job in balancing the needs of both experienced and novice software engineers Robert G Pettit IV Ph D Adjunct Professor of Software Engineering George Mason University This breakthrough book provides a comprehensive step by step approach on how to develop software product lines which is of great strategic benefit to industry The development of software product lines enables significant reuse of software architectures Practitioners will benefit from the well defined PLUS process and rich case studies Hurley V Blankenship II Program Manager Justice and Public Safety Science Applications International Corporation The Product Line UML based Software engineering PLUS is leading edge With the author's wide experience and deep knowledge PLUS is well harmonized with architectural and design pattern technologies Michael Shin Assistant Professor Texas Tech University Long a standard practice in traditional manufacturing the concept of product lines is quickly earning recognition in the software industry A software product line is a family of systems that shares a common set of core technical assets with preplanned extensions and variations to address the needs of specific customers or market segments When skillfully implemented a product line strategy can yield enormous gains in productivity quality and time to market Studies indicate that if three or more systems with a degree of common functionality are to be developed a product line approach is significantly more cost effective To model and design families of systems the analysis and design concepts for single product systems need to be extended to support product lines *Designing Software Product Lines with UML* shows how to employ the latest version of the industry standard Unified Modeling Language UML 2.0 to reuse software requirements and architectures rather than starting the development of each new system from scratch Through real world case studies the book illustrates the fundamental concepts and technologies used in the design and implementation of software product lines This book describes a new UML based

software design method for product lines called PLUS Product Line UML based Software engineering PLUS provides a set of concepts and techniques to extend UML based design methods and processes for single systems in a new dimension to address software product lines Using PLUS the objective is to explicitly model the commonality and variability in a software product line Hassan Gomaa explores how each of the UML modeling views use case static state machine and interaction modeling can be extended to address software product families He also discusses how software architectural patterns can be used to develop a reusable component based architecture for a product line and how to express this architecture as a UML platform independent model that can then be mapped to a platform specific model Key topics include Software product line engineering process which extends the Unified Development Software Process to address software product lines Use case modeling including modeling the common and variable functionality of a product line Incorporating feature modeling into UML for modeling common optional and alternative product line features Static modeling including modeling the boundary of the product line and information intensive entity classes Dynamic modeling including using interaction modeling to address use case variability State machines for modeling state dependent variability Modeling class variability using inheritance and parameterization Software architectural patterns for product lines Component based distributed design using the new UML 2.0 capability for modeling components connectors ports and provided and required interfaces Detailed case studies giving a step by step solution to real world product line problems Designing Software Product Lines with UML is an invaluable resource for all designers and developers in this growing field The information technology and case studies presented here show how to harness the promise of software product lines and the practicality of the UML to take software design quality and efficiency to the next level An enhanced online index allows readers to quickly and easily search the entire text for specific topics

Analysis Patterns Martin Fowler,1997 Martin Fowler is a consultant specializing in object oriented analysis and design This book presents and discusses a number of object models derived from various problem domains All patterns and models presented have been derived from the author s own consulting work and are based on real business cases

**The Rational Unified Process Made Easy** Per Kroll,Philippe Kruchten,2003 The authors explain the underlying software development principles behind theRUP and guide readers in its application in their organization

*Component-based Development* Katharine Whitehead,2002 This book aims to introduce the key principles of CBD that need to be understood in order to adopt a component based model of software systems development and to explain the benefits of adopting such an approach for an organization

**Software Product Lines** ,2002 **Component-based Software Engineering** ,2005

**The Rational Unified Process** Philippe Kruchten,2004 bull Reflects all of the changes that were integrated into RUP v2003 the latest version of the very popular produc t bull Learn the key concepts fundamentals of structure integral content and motivation behind the RUP bull Covers all phases of the software development lifecycle from concept to delivery to revision

*UML and the Unified Process* Jim Arlow,Ila Neustadt,2002 1 What is UML 2 What is

the Unified Process 3 The requirements workflow 4 Use case modeling 5 Advanced use case modeling 6 The analysis workflow 7 Objects and classes 8 Finding analysis classes 9 Relationships 10 Inheritance and polymorphism 11 Analysis packages 12 Use case realization 13 Advanced use case realization 14 The design workflow 15 Design classes 16 Refining analysis relationships 17 Interfaces and components 18 Use case realization design 19 Basic statecharts 20 Advanced statecharts 21 The implementation workflow 22 Components 23 Deployment

**Advanced Topics in Database Research**  
Keng Siau, 2004 Advanced Topics in Database Research is a series of books on the fields of database software engineering and systems analysis and design They feature the latest research ideas and topics on how to enhance current database systems improve information storage refine existing database models and develop advanced applications Advanced Topics in Database Research Volume 5 is a part of this series Advanced Topics in Database Research Volume 5 presents the latest research ideas and topics on database systems and applications and provides insights into important developments in the field of database and database management This book describes the capabilities and features of new technologies and methodologies and presents state of the art research ideas with an emphasis on theoretical issues regarding databases and database management Publisher Proceedings of the ESEIW 2003 Workshop on Empirical Studies in Software Engineering Andreas Jedlitschka, 2004 *Computational Science and Its Applications*, 2003

**The Art of ClearCase Deployment** Christian D. Buckley, Darren W. Pulsipher, 2005

**Aspect-oriented Software Development with Use Cases** Ivar Jacobson, Pan-Wei Ng, 2005 A refreshingly new approach toward improving use case modeling by fortifying it with aspect orientation Ramnivas Laddad author of AspectJ in Action Since the 1980s use cases have been a way to bring users into software design but translating use cases into software has been an art at best because user goods often don't respect code boundaries Now that aspect oriented programming AOP can express crosscutting concerns directly in code the man who developed use cases has proposed step by step methods for recognizing crosscutting concerns in use cases and writing the code in separate modules If these methods are at all fruitful in your design and development practice they will make a big difference in software quality for developers and users alike Wes Isberg AspectJ team member This book not only provides ideas and examples of what aspect oriented software development is but how it can be utilized in a real development project Michael Ward ThoughtWorks Inc No system has ever been designed from scratch perfectly every system is composed of features layered in top of features that accumulate over time Conventional design techniques do not handle this well and over time the integrity of most systems degrades as a result For the first time here is a set of techniques that facilitates composition of behavior that not only allows systems to be defined in terms of layered functionality but composition is at the very heart of the approach This book is an important advance in modern methodology and is certain to influence the direction of software engineering in the next decade just as Object Oriented Software Engineering influenced the last Kurt Bittner IBM Corporation Use cases are an excellent means to capture system requirements and drive a user centric view of system

development and testing This book offers a comprehensive guide on explicit use case driven development from early requirements modeling to design and implementation It provides a simple yet rich set of guidelines to realize use case models using aspect oriented design and programming It is a valuable resource to researchers and practitioners alike Dr Awais Rashid Lancaster University U K and author of Aspect Oriented Database Systems AOSD is important technology that will help developers produce better systems Unfortunately it has not been obvious how to integrate AOSD across a project s lifecycle This book shatters that barrier providing concrete examples on how to use AOSD from requirements analysis through testing Charles B Haley research fellow The Open University U K Aspect oriented programming AOP is a revolutionary new way to think about software engineering AOP was introduced to address crosscutting concerns such as security logging persistence debugging tracing distribution performance monitoring and exception handling in a more effective manner Unlike conventional development techniques which scatter the implementation of each concern into multiple classes aspect oriented programming localizes them Aspect oriented software development AOSD uses this approach to create a better modularity for functional and nonfunctional requirements platform specifics and more allowing you to build more understandable systems that are easier to configure and extend to meet the evolving needs of stakeholders In this highly anticipated new book Ivar Jacobson and Pan Wei Ng demonstrate how to apply use cases a mature and systematic approach to focusing on stakeholder concerns and aspect orientation in building robust and extensible systems Throughout the book the authors employ a single real world example of a hotel management information system to make the described theories and practices concrete and understandable The authors show how to identify design implement test and refactor use case modules as well as extend them They also demonstrate how to design use case modules with the Unified Modeling Language UML emphasizing enhancements made in UML 2 0 and how to achieve use case modularity using aspect technologies notably AspectJ Key topics include Making the case for use cases and aspects Capturing and modeling concerns with use cases Keeping concerns separate with use case modules Modeling use cases slices and aspects using the newest extensions to the UML notation Applying use cases and aspects in projects Whatever your level of experience with aspect oriented programming Aspect Oriented Software Development with Use Cases will teach you how to develop better software by embracing the paradigm shift to AOSD

**Logic-based Program Synthesis and Transformation / ,2003**

## **Component Based Product Line Engineering With Uml** Book Review: Unveiling the Power of Words

In a global driven by information and connectivity, the ability of words has be more evident than ever. They have the capability to inspire, provoke, and ignite change. Such may be the essence of the book **Component Based Product Line Engineering With Uml**, a literary masterpiece that delves deep to the significance of words and their affect our lives. Compiled by a renowned author, this captivating work takes readers on a transformative journey, unraveling the secrets and potential behind every word. In this review, we shall explore the book is key themes, examine its writing style, and analyze its overall effect on readers.

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