

# Holmes: A System to Support Software Product Lines

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## KEYWORDS

Software product lines, tool support, JavaSpaces

## 1 INTRODUCTION

Holmes is a tool designed to support the Sherlock [2] software product line methodology. Holmes attempts to provide comprehensive support for product line development, from market and product strategy analysis to modeling, designing, and developing the resulting system.

## 2 ARCHITECTURE

Figure 1 shows the overall architecture of Holmes. It centres on the use of JavaSpaces [1] as a distributed blackboard of objects. This type of architecture was chosen because it is a simple way to support change consistency management, multi-user support, and tool integration, three key issues in the complex, multi-stakeholder, multi-activity development of a line of software products.

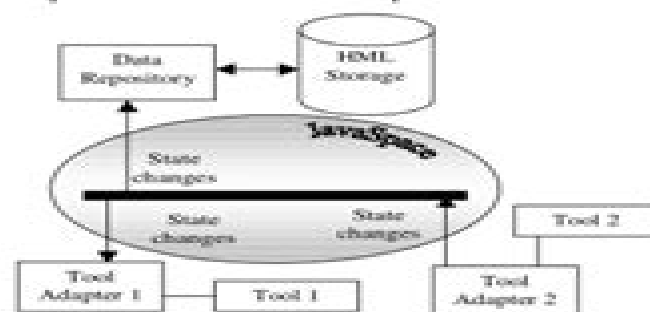


Figure 1: Holmes architecture with one event queue

The data repositories serve as persistent storage for data in a common XML-based format. Holmes uses multiple distributed event queue [1] data structures to allow changes

to propagate between tools and to the repositories. Each event queue is distinguished by the type of event and is not coupled to any particular tool. The JavaSpace is readily accessible by multiple machines, thus supporting distributed multi-user access; each user's client can just connect to the space and then post and listen to the appropriate event queue.

## 3 TOOLS

Several tools have been developed for Holmes. The domain definition tool supports adding and editing the vocabulary and other information in the domain.

Domain characterization supports the analysis of existing and proposed products. This includes examining the potential flow of users to a new product and the compatibility relationships with existing formats and interfaces. Holmes allows the user to enter information related to this analysis and generates visual representations of the user flows and compatibility relationships.

Two major activities of software product line development are the analysis of commonality and variability analysis, and the development of product strategies. These activities are supported by the domain scoping tool. Product strategies can be defined and compared based on their support of variants. Comparison is accomplished using projections of user-selected variation points.

To provide semantic support, Holmes also uses a critiquing system [3]. This system is based on a Prolog database built from events that are posted to the JavaSpace. When particular queries become positive, the critiquing tool will post "advice" that will be read by a separate "To do list" tool. The interface for "advice" is standardized to allow multiple critiquing systems to analyze posted events and provide specialized advice.

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# Process Support Of Software Product Lines Proceedings

**Timo Käkölä, Juan Carlos Dueñas**



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UML-Based Software Product Line Engineering with SMarty Edson Oliveira Jr, 2023-02-06 This book is about software product lines SPLs designed and developed taking UML diagrams as the primary basis modeled according to a rigorous approach composed of an UML profile and a systematic process for variability management activities forming the Stereotype based Management of Variability SMarty approach The book consists of five parts Part I provides essential concepts on SPL in terms of the first development methodologies It also introduces variability concepts and discusses SPL architectures finishing with the SMarty approach Part II is focused on the design verification and validation of SMarty SPLs and Part III concentrates on the SPL architecture evolution based on ISO IEC metrics the System PLA method optimization with the MOA4PLA method and feature interaction prevention Next Part IV presents SMarty as a basis for SPL development such as the M SPLearning SPL for mobile learning applications the PLeTs SPL for testing tools the PlugSPL plugin environment for supporting the SPL life cycle the SyMPLES approach for designing embedded systems with SysML the SMartySPeM approach for software process lines SPRL and re engineering of class diagrams into an SPL Eventually Part V promotes controlled experimentation in UML based SPLs presenting essential concepts on how to plan conduct and document experiments as well as showing several experiments carried out with SMarty This book aims at lecturers graduate students and experienced practitioners Lecturers might use the book for graduate level courses about SPL fundamentals and tools students will learn about the SPL engineering process variability management and mass customization and practitioners will see how to plan the transition from single product development to an SPL based process how to document inherent variability in a given domain or how to apply controlled experiments to SPLs **Applied Software Product Line**

**Engineering** Kyo C. Kang, Vijayan Sugumaran, Sooyong Park, 2009-12-22 Over the last decade software product line engineering SPLE has emerged as one of the most promising software development paradigms for increasing productivity in IT related industries Detailing the various aspects of SPLE implementation in different domains Applied Software Product Line Engineering documents best practices with regard to syst *Software Evolution and Maintenance* Priyadarshi Tripathy, Kshirasagar Naik, 2014-11-17 Provides students and engineers with the fundamental developments and common practices of software evolution and maintenance Software Evolution and Maintenance A Practitioner's Approach introduces readers to a set of well rounded educational materials covering the fundamental developments in software evolution and common maintenance practices in the industry Each chapter gives a clear understanding of a particular topic in software evolution and discusses the main ideas with detailed examples The authors first explain the basic concepts and then drill deeper into the important aspects of software evolution While designed as a text in an undergraduate course in software evolution and maintenance the book is also a great resource for software engineers information technology professionals and graduate students in software engineering Based on the IEEE SWEBOK Software Engineering Body of Knowledge Explains

two maintenance standards IEEE EIA 1219 and ISO IEC14764 Discusses several commercial reverse and domain engineering toolkits Slides for instructors are available online Software Evolution and Maintenance A Practitioner s Approach equips readers with a solid understanding of the laws of software engineering evolution and maintenance models reengineering techniques legacy information systems impact analysis refactoring program comprehension and reuse *Software Product Lines* Timo Käkölä, Juan Carlos Dueñas, 2007-02-07 Between July 1999 and June 2005 a group of European companies research institutes and universities executed the EUREKA ITEA projects ESAPS CAF and FAMILIES on the topic of product line engineering The projects originated from the need of the industry to improve software engineering performance by organizing product development in product lines The results obtained within the projects have been implemented in several large industries e g automotive e business medical systems and mobile phones They involve a radical shift in software construction and production The most important research results of the projects are collected in this book Product line engineering was already applied within industry in the 1980s and presumably earlier In the 1980s good architects in many telecommunications c panies based their architectures on the ideas of David Parnas who published on the subject of program families They were facilitated by the CHILL language widely used by the telecommunications companies This language deploys the same modularity principles as the Modula programming language family Modularity is a crucial ingredient for implementing systems with a component based architecture Being able to compose the products of components is an important mechanism in all product line architectures In the 1990s the product line ideas started to gain ground in other industries Around 1995 the company experiences reached the academia and since then people in companies and academia have collaborated widely on this subject The ESAPS CAF and FAMILIES projects manifest an institutionalized form of this collaboration **Proceedings of the Joint 10th European Software Engineering Conference (ESEC) and the 13th ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE-13)** Harald Gall, 2005 **Evaluation of Novel Approaches to Software Engineering** Leszek Maciaszek, César González-Pérez, Stefan Jablonski, 2010-10-06 Software engineering is understood as a broad term linking science traditional en neering art and management and is additionally conditioned by social and external factors conditioned to the point that brilliant engineering solutions based on strong science showing artistic creativity and skillfully managed can still fail for reasons beyond the control of the development team Modern software engineering needs a paradigm shift commensurate with a change of the computing paradigm from 1 Algorithms to interactions and from procedural to object oriented programming 2 Systems development to systems integration 3 Products to services Traditional software engineering struggles to address this paradigm shift to inter tions integration and services It offers only incomplete and disconnected methods for building information systems with fragmentary ability to dynamically accom date change and to grow gracefully The principal objective of contemporary software engineering should therefore be to try to redefine the entire discipline and offer a complete set of methods tools and

techniques to address challenges ahead that will shape the information systems of the future

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