



DSL Engineering

*Designing, Implementing and Using
Domain-Specific Languages*

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Dsl Engineering Designing Implementing And Using Domain Specific Languages

IEEE Computer Society



Dsl Engineering Designing Implementing And Using Domain Specific Languages:

DSL Engineering Markus Voelter, 2013 The definitive resource on domain specific languages based on years of real world experience relying on modern language workbenches and full of examples Domain Specific Languages are programming languages specialized for a particular application domain By incorporating knowledge about that domain DSLs can lead to more concise and more analyzable programs better code quality and increased development speed This book provides a thorough introduction to DSL relying on today s state of the art language workbenches The book has four parts introduction DSL design DSL implementation as well as the role of DSLs in various aspects of software engineering Part I Introduction This part introduces DSLs in general and discusses their advantages and drawbacks It also defines important terms and concepts and introduces the case studies used in the most of the remainder of the book Part II DSL Design This part discusses the design of DSLs independent of implementation techniques It reviews seven design dimensions explains a number of reusable language paradigms and points out a number of process related issues Part III DSL Implementation This part provides details about the implementation of DSLs with lots of code It uses three state of the art but quite different language workbenches JetBrains MPS Eclipse Xtext and TU Delft s Spoofax Part IV DSLs and Software Engineering This part discusses the use of DSLs for requirements architecture implementation and product line engineering as well as their roles as a developer utility and for implementing business logic The book is available as a printed version the one your are looking at and as a PDF For details see the book s companion website at <http://dslbook.org>

Domain-Specific Languages Andrzej Wąsowski, Thorsten Berger, 2023-02-01 This textbook describes the theory and the pragmatics of using and engineering high level software languages also known as modeling or domain specific languages DSLs for creating quality software This includes methods design patterns guidelines and testing practices for defining the syntax and the semantics of languages While remaining close to technology the book covers multiple paradigms and solutions avoiding a particular technological silo It unifies the modeling the object oriented and the functional programming perspectives on DSLs The book has 13 chapters Chapters 1 and 2 introduce and motivate DSLs Chapter 3 kicks off the DSL engineering lifecycle describing how to systematically develop abstract syntax by analyzing a domain Chapter 4 addresses the concrete syntax including the systematic engineering of context free grammars Chapters 5 and 6 cover the static semantics with basic constraints as a starting point and type systems for advanced DSLs Chapters 7 Transformation 8 Interpretation and 9 Generation describe different paradigms for designing and implementing the dynamic semantics while covering testing and other kinds of quality assurance Chapter 10 is devoted to internal DSLs Chapters 11 to 13 show the application of DSLs and engage with simpler alternatives to DSLs in a highly distinguished domain software variability These chapters introduce the underlying notions of software product lines and feature modeling The book has been developed based on courses on model driven software engineering MDSE and DSLs held by the authors It aims at senior undergraduate and junior graduate students in computer

science or software engineering Since it includes examples and lessons from industrial and open source projects as well as from industrial research practitioners will also find it a useful reference The numerous examples include code in Scala 3 ATL Alloy C F Groovy Java JavaScript Kotlin OCL Python QVT Ruby and Xtend The book contains as many as 277 exercises The associated code repository facilitates learning and using the examples in a course

Domain-Specific Languages in Practice Antonio Bucchiarone, Antonio Cicchetti, Federico Cicciozzi, Alfonso Pierantonio, 2021-06-24 This book covers several topics related to domain specific language DSL engineering in general and how they can be handled by means of the JetBrains Meta Programming System MPS an open source language workbench developed by JetBrains over the last 15 years The book begins with an overview of the domain of language workbenches which provides perspectives and motivations underpinning the creation of MPS Moreover technical details of the language underneath MPS together with the definition of the tool's main features are discussed The remaining ten chapters are then organized in three parts each dedicated to a specific aspect of the topic Part I MPS in Industrial Applications deals with the challenges and inadequacies of general purpose languages used in companies as opposed to the reasons why DSLs are essential together with their benefits and efficiency and summarizes lessons learnt by using MPS Part II about MPS in Research Projects covers the benefits of text based languages the design and development of gamification applications and research fields with generally low expertise in language engineering Eventually Part III focuses on Teaching and Learning with MPS by discussing the organization of both commercial and academic courses on MPS MPS is used to implement languages for real world use Its distinguishing feature is projectional editing which supports practically unlimited language extension and composition possibilities as well as a flexible mix of a wide range of textual tabular mathematical and graphical notations The number and diversity of the presented use cases demonstrate the strength and malleability of the DSLs defined using MPS The selected contributions represent the current state of the art and practice in using JetBrains MPS to implement languages for real world applications

Simulation, Modeling, and Programming for Autonomous Robots Davide Brugali, Jan Broenink, Torsten Kroeger, Bruce MacDonald, 2014-09-19 This book constitutes the refereed proceedings of the 4th International Conference on Simulation Modeling and Programming for Autonomous Robots SIMPAR 2014 held in Bergamo Italy in October 2014 The 49 revised full papers presented were carefully reviewed and selected from 62 submissions The papers are organized in topical sections on simulation modeling programming architectures methods and tools and systems and applications

Variable Domain-specific Software Languages with DjDSL Stefan Sobernig, 2020-07-09 This book details the conceptual foundations design and implementation of the domain specific language DSL development system DjDSL DjDSL facilitates design decision making on and implementation of reusable DSL and DSL product lines and represents the state of the art in language based and composition based DSL development As such it unites elements at the crossroads between software language engineering model driven software engineering and feature oriented software engineering The book is divided into six

chapters Chapter 1 DSL as Variable Software explains the notion of DSL as variable software in greater detail and introduces readers to the idea of software product line engineering for DSL based software systems Chapter 2 Variability Support in DSL Development sheds light on a number of interrelated dimensions of DSL variability variable development processes variable design decisions and variability implementation techniques for DSL The three subsequent chapters are devoted to the key conceptual and technical contributions of DjDSL Chapter 3 Variable Language Models explains how to design and implement the abstract syntax of a DSL in a variable manner Chapter 4 Variable Context Conditions then provides the means to refine an abstract syntax language model by using composable context conditions invariants Next Chapter 5 Variable Textual Syntaxes details solutions to implementing variable textual syntaxes for different types of DSL In closing Chapter 6 A Story of a DSL Family shows how to develop a mixed DSL in a step by step manner demonstrating how the previously introduced techniques can be employed in an advanced example of developing a DSL family The book is intended for readers interested in language oriented as well as model driven software development including software engineering researchers and advanced software developers alike An understanding of software engineering basics architecture design implementation testing and software patterns is essential Readers should especially be familiar with the basics of object oriented modelling UML MOF Ecore and programming e g Java

Software Languages Ralf Lämmel, 2018-05-17 This book identifies defines and illustrates the fundamental concepts and engineering techniques relevant to applications of software languages in software development It presents software languages primarily from a software engineering perspective i e it addresses how to parse analyze transform generate format and otherwise process software artifacts in different software languages as they appear in software development To this end it covers a wide range of software languages most notably programming languages domain specific languages modeling languages exchange formats and specifically also language definition languages Further different languages are leveraged to illustrate software language engineering concepts and techniques The functional programming language Haskell dominates the book while the mainstream programming languages Python and Java are additionally used for illustration By doing this the book collects and organizes scattered knowledge from software language engineering focusing on application areas such as software analysis software reverse engineering software transformation software re engineering software composition modularity and domain specific languages It is designed as a textbook for independent study as well as for bachelor s advanced level or master s university courses in Computer Science An additional website provides complementary material for example lecture slides and videos This book is a valuable resource for anyone wanting to understand the fundamental concepts and important engineering principles underlying software languages allowing them to acquire much of the operational intelligence needed for dealing with software languages in software development practice This is an important skill set for software engineers as languages are increasingly permeating software development

Encyclopedia of Computer Science and Technology Phillip A.

Laplane,2017-10-02 With breadth and depth of coverage the Encyclopedia of Computer Science and Technology Second Edition has a multi disciplinary scope drawing together comprehensive coverage of the inter related aspects of computer science and technology The topics covered in this encyclopedia include General and reference Hardware Computer systems organization Networks Software and its engineering Theory of computation Mathematics of computing Information systems Security and privacy Human centered computing Computing methodologies Applied computing Professional issues Leading figures in the history of computer science The encyclopedia is structured according to the ACM Computing Classification System CCS first published in 1988 but subsequently revised in 2012 This classification system is the most comprehensive and is considered the de facto ontological framework for the computing field The encyclopedia brings together the information and historical context that students practicing professionals researchers and academicians need to have a strong and solid foundation in all aspects of computer science and technology Software Reuse: Bridging with Social-Awareness Georgia M. Kapitsaki,Eduardo Santana de Almeida,2016-05-20 This book constitutes the refereed proceedings of the 15th International Conference on Software Reuse ICSR 2016 held in Limassol Cyprus in June 2016 The 21 revised full papers presented together with 4 revised short papers were carefully reviewed and selected from 51 submissions The papers cover different areas of software engineering where software reuse plays an important role such as software product lines domain analysis and modeling software tools and business aspects of software ICSR 2016 has provided a complete view on the advancements in the area of software reuse in the last years for interested researchers and practitioners Software Quality: Methods and Tools for Better Software and Systems Dietmar Winkler,Stefan Biffl,Johannes Bergsmann,2018-01-08 This book constitutes the refereed proceedings of the 10th Software Quality Days Conference SWQD 2018 held in Vienna Austria in January 2018 The Software Quality Days SWQD conference started in 2009 and has grown to the biggest conferences on software quality in Europe with a strong community The program of the SWQD conference is designed to encompass a stimulating mixture of practical presentations and new research topics in scientific presentations The guiding conference topic of the SWQD 2018 is Software Quality 4 0 Methods and Tools for better Software and Systems as novel technologies include new challenges and might require new and adapted methods and tools to support quality assurance activities early The 6 full papers and 2 short papers presented in this volume were carefully reviewed and selected from 16 submissions The volume also contains 2 invited talks The contributions were organized in topical sections named safety and security requirements engineering and requirements based testing crowdsourcing in software engineering software and systems architecture experimentation in software engineering and smart environments Emerging Perspectives in Big Data Warehousing Taniar, David,Rahayu, Wenny,2019-06-28 The concept of a big data warehouse appeared in order to store moving data objects and temporal data information Moving objects are geometries that change their position and shape continuously over time In order to support spatio temporal data a data model and associated query language is needed for

supporting moving objects Emerging Perspectives in Big Data Warehousing is an essential research publication that explores current innovative activities focusing on the integration between data warehousing and data mining with an emphasis on the applicability to real world problems Featuring a wide range of topics such as index structures ontology and user behavior this book is ideally designed for IT consultants researchers professionals computer scientists academicians and managers

An Extensible Component & Connector Architecture Description Infrastructure for Multi-Platform Modeling Andreas Wortmann, 2016-11-08 Software engineering for complex systems requires abstraction multi domain expertise separation of concerns and reuse Domain experts rarely are software engineers and should formulate solutions using their domain s vocabulary instead of general purpose programming languages GPLs Successful integration of domain specific languages DSLs into a software system requires a separation of concerns between domain issues and integration issues while retaining a loose enough coupling to support DSL reuse in different contexts Component based software engineering CBSE increases reuse and separation of concerns by encapsulating functionalities in components Components are GPL artifacts which raises accidental complexities Model driven engineering MDE abstracts from GPLs by lifting models to primary development artifacts Models can be abstract and better comprehensible by using domain vocabulary instead of a GPL They can be platform independent and translated into GPLs for different target platforms Component connector C C architecture description languages ADLs combine CBSE and MDE to compose of architectures from component models We present concepts for engineering software systems with exchangeable component behavior languages The concepts are realized in a software architecture modeling infrastructure that comprises modeling languages to develop applications based on C C software architectures with exchangeable component behavior DSLs It supports transformations from platform independent to platform specific software architectures and compositional code generation With this it enables domain experts to re use the most appropriate component behavior DSL and facilitates composition of domain solutions through encapsulation in components

Proceedings of the Conference on Domain-Specific Languages, October 15-17, 1997, Santa Barbara, California USENIX Association, 1997 [Proceedings of the 34th Annual Hawaii International Conference on System Sciences](#) Ralph H. Sprague, Jr., 2001 Annotation Contains abstracts of 440 papers presented at the January 2001 conference in nine major tracks The session topics are collaboration systems and technology complex systems decision technologies for management digital documents emerging technologies information technology in health care Internet and the digital economy organizational systems and technology and software technology Subject headings within the sessions include asynchronous learning networks intelligent systems in traffic and transportation e government telemedicine web engineering community informatics trends in outsourcing of information systems mobile computing and wireless networks and domain specific languages for software engineering No subject index The CD ROM contains the complete papers in Adobe Acrobat format The disc is of a hybrid structure that allows access from PCs Macintosh and UNIX Annotation copyrighted by Book

News Inc Portland OR **DSLs in Boo** Oren Eini,2009-12-31 A general purpose language like C is designed to handle all programming tasks By contrast the structure and syntax of a Domain Specific Language are designed to match a particular applications area A DSL is designed for readability and easy programming of repeating problems Using the innovative Boo language it s a breeze to create a DSL for your application domain that works on NET and does not sacrifice performance DSLs in Boo shows you how to design extend and evolve DSLs for NET by focusing on approaches and patterns You learn to define an app in terms that match the domain and to use Boo to build DSLs that generate efficient executables And you won t deal with the awkward XML laden syntax many DSLs require The book concentrates on writing internal textual DSLs that allow easy extensibility of the application and framework And if you don t know Boo don t worry you ll learn right here all the techniques you need Purchase of the print book comes with an offer of a free PDF ePub and Kindle eBook from Manning Also available is all code from the book **ACM SIGPLAN Notices** ,2006 **The 14th IEEE International Conference on Automated Software Engineering** IEEE Computer Society,1999 Twenty five papers presented at the October 1999 conference are grouped into sessions having the broad topics of software synthesis requirements elicitation reuse test synthesis analysis verification transformation architecture and automated testing Among the topics are data mining library reuse patterns in user selected applications industrial applications of software synthesis via category theory automated translation of UML models of architectures for verification and simulation using SPIN verification of picture generated code evolving object oriented designs with refactorings automatically detecting mismatches during component based and model based development and an overview of Lutess a specification based tool for testing synchronous software There are also 25 short papers that represent novel work not yet fully mature No subject index Annotation copyrighted by Book News Inc Portland OR *Building User-Friendly DSLs* Meinte Boersma,2024-12-17 Craft domain specific languages that empower experts to create software themselves Domain specific languages put business experts at the heart of software development These purpose built tools let your clients write down their business knowledge and have it automatically translated into working software no dev time required They seamlessly bridge the knowledge gap between programmers and subject experts enabling better communication and freeing you from time consuming code adjustments Inside Building User Friendly DSLs you ll learn how to Build a complete Domain IDE for a car rental company Implement a projectional editor for your DSL Implement content assist type systems expressions and versioning language aspects Evaluate business rules Work with Abstract Syntax Trees Reduce notated DSL content in concrete syntax into abstract syntax Building User Friendly DSLs takes you on a carefully planned journey through everything you need to create your own DSLs It focuses on building DSLs that are easy for busy business experts to learn and master By working through a detailed example of a car rental company you ll see how to create a custom DSL with a modern and intuitive UI that can replace tedious coding activities About the technology Here s the central problem of software development business users know what they need their apps to do but they don t

know how to write the code themselves As a developer this means you spend a lot of time learning the same domain specific details your user already knows Now there s a way to bridge this gap You can create a Domain Specific Language DSL that empowers non technical business users to create and customize their own applications without writing any code About the book Building User Friendly DSLs teaches you how to create a complete domain specific language that looks and works like a web application These easy to use DSLs put the power to create custom software into the hands of business domain experts As you go you ll cover all the essentials from establishing structure and syntax of your DSL to implementing a user friendly interface What s inside Implement a projectional editor for your DSL Work with Abstract Syntax Trees Evaluate business rules About the reader For developers with JavaScript and web development experience About the author Meinte Boersma is a senior developer and an evangelist of model driven software development and DSLs Table of Contents 1 What is a domain specific language 2 Representing DSL content as structured data 3 Working with ASTs in code 4 Projecting the AST 5 Editing values in the projection 6 Editing objects in the projection 7 Implementing persistence and transportation of ASTs 8 Generating code from the AST 9 Preventing things from blowing up 10 Managing change 11 Implementing expressions Binary operations 12 Implementing expressions Order of operations 13 Implementing a type system 14 Implementing business rules 15 Some topics we didn t cover *Fundamental Approaches to Software Engineering* ,2000

Encyclopedia of Library and Information Science Allen Kent,Harold Lancour,William Z. Nasri,Jay Elwood Daily,1968 Vol 73 index to v 48 72 Proceedings of the 2nd Conference on Domain-Specific Languages (DSL '99) ,2000

The Enigmatic Realm of **Dsl Engineering Designing Implementing And Using Domain Specific Languages**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing short of extraordinary. Within the captivating pages of **Dsl Engineering Designing Implementing And Using Domain Specific Languages** a literary masterpiece penned with a renowned author, readers attempt a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book's core themes, assess its distinct writing style, and delve into its lasting affect the hearts and minds of people who partake in its reading experience.

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