

Free Domain Specific Languages By Martin Fowler

Ranging from low-level application and architecture optimizations to high-level modeling and exploration concerns, this authoritative reference compiles essential research on various levels of abstraction appearing in embedded systems and software design. It promotes platform-based design for improved system implementation and modeling and enhanced performance and cost analyses. Domain-Specific Processors relies upon notions of concurrency and parallelism to satisfy performance and cost constraints resulting from increasingly complex applications and architectures and addresses concepts in specification, simulation, and verification in embedded systems and software design.

Biomedical Natural Language Processing is a comprehensive tour through the classic and current work in the field. It discusses all subjects from both a rule-based and a machine learning approach, and also describes each subject from the perspective of both biological science and clinical medicine. The intended audience is readers who already have a background in natural language processing, but a clear introduction makes it accessible to readers from the fields of bioinformatics and computational biology, as well. The book is suitable as a reference, as well as a text for advanced courses in biomedical natural language processing and text mining. This book constitutes the proceedings of the 22nd International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI 2021, which was held virtually during January 17-19, 2021. The conference was planned to take place in Copenhagen, Denmark, but changed to an online event due to the COVID-19 pandemic. The 23 papers presented in this volume were carefully reviewed from 48 submissions. VMCAI provides a forum for researchers working on verification, model checking, and abstract interpretation and facilitates interaction, cross-fertilization, and advancement of hybrid methods that combine these and related areas. The papers presented in this volume were organized in the following topical sections: hyperproperties and infinite-state systems; concurrent and distributed systems; checking; synthesis and repair; applications; and decision procedures.

Domain-Specific Languages (DSLs)--languages geared to specific vertical or horizontal areas of interest--are generating growing excitement from software engineers and architects. DSLs bring new agility to the creation and evolution of software, allowing selected design aspects to be expressed in terms much closer to the system requirements than standard program code, significantly reducing development costs in large-scale projects and product lines. In this breakthrough book, four leading experts reveal exactly how DSLs work, and how you can make the most of them in your environment. With Domain-Specific Development with Visual Studio DSL Tools , you'll begin by mastering DSL concepts and techniques that apply to all platforms. Next, you'll discover how to create and use DSLs with the powerful new Microsoft DSL Tools--a toolset designed by this book's authors. Learn how the DSL Tools integrate into Visual Studio--and how to define DSLs and generate Visual Designers using Visual Studio's built-in modeling technology. In-depth coverage includes Determining whether DSLs will work for you Comparing DSLs with other approaches to model-driven development Defining, tuning, and evolving DSLs: models, presentation, creation, updates, serialization, constraints, validation, and more Creating Visual Designers for new DSLs with little or no coding Multiplying productivity by generating application code from your models with easy-to-use text templates Automatically generating configuration files, resources, and other artifacts Deploying Visual Designers across the organization, quickly and easily Customizing Visual Designers for specialized process needs List of Figures List of Tables Foreword Preface About the Authors Chapter 1 Domain-Specific Development Chapter 2 Creating and Using DSLs Chapter 3 Domain Model Definition Chapter 4 Presentation Chapter 5 Creation, Deletion, and Update Behavior Chapter 6 Serialization Chapter 7 Constraints and Validation Chapter 8 Generating Artifacts Chapter 9 Deploying a DSL Chapter 10 Advanced DSL Customization Chapter 11 Designing a DSL Index Language Implementation Patterns

Domain Specific Languages in .NET

Generative and Transformational Techniques in Software Engineering

International Summer School, GTTSE 2005, Braga, Portugal, July 4-8, 2005. Revised Papers

Domain-Driven Design Quickly

Domain-Specific Languages

Verification, Model Checking, and Abstract Interpretation

Dijkstra once wrote that computer science is no more about computers than astronomy is about telescopes. Despite the many incredible advances in computer science from times that predate practical mechanical computing, there is still a myriad of fundamental questions in understanding the interface between computers and the rest of the world. Why is it still hard to mechanize many tasks that seem to be fundamentally routine, even as we see ever-increasing capacity for raw mechanical computing? The disciplined study of domain-specific languages (DSLs) is an emerging area in computer science, and is one which has the potential to revolutionize the field, and bring us closer to answering this question. DSLs are formalisms that have four general characteristics. – They relate to a well-defined domain of discourse, be it controlling traffic lights or space ships. – They have well-defined notation, such as the ones that exist for prescribing music, dance routines, or strategy in a football game. – The informal or intuitive meaning of the notation is clear. This can easily be overlooked, especially since intuitive meaning can be expressed by many different notations that may be received very differently by users. – The formal meaning is clear and mechanizable, as is, hopefully, the case for the instructions we give to our bank or to a merchant online.

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.

Summary Dependency Injection Principles, Practices, and Patterns teaches you to use DI to reduce hard-coded dependencies between application components. You'll start by learning what DI is and what types of applications will benefit from it. Then, you'll work through concrete scenarios using C# and the .NET framework to implement DI in your own projects. As you dive into the thoroughly-explained examples, you'll develop a foundation you can apply to any of the many DI libraries for .NET and .NET Core. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Dependency Injection (DI) is a great way to reduce tight coupling between software components. Instead of hard-coding dependencies, such as specifying a database driver, you make those connections through a third party. Central to application frameworks like ASP.NET Core, DI enables you to better manage changes and other complexity in your software. About the Book Dependency Injection Principles, Practices, and Patterns is a revised and expanded edition of the bestselling classic Dependency Injection in .NET. It teaches you DI from the ground up, featuring relevant examples, patterns, and anti-patterns for creating loosely coupled, well-structured applications. The well-annotated code and diagrams use C# examples to illustrate principles that work flawlessly with modern object-oriented languages and DI libraries. What's Inside Refactoring existing code into loosely coupled code DI techniques that work with statically typed OO languages Integration with common .NET frameworks Updated examples illustrating DI in .NET Core About the Reader For intermediate OO developers. About the Authors Mark Seemann is a programmer, software architect, and speaker who has been working with software since 1995, including six years with Microsoft. Steven van Deursen is a seasoned .NET developer and architect, and the author and maintainer of the Simple Injector DI library. Table of Contents PART 1 Putting Dependency Injection on the map The basics of Dependency Injection: What, why, and how Writing tightly coupled code Writing loosely coupled code PART 2 Catalog DI patterns DI anti-patterns Code smells PART 3 Pure DI Application composition Object lifetime Interception Aspect-Oriented Programming by design Tool-based Aspect-Oriented Programming PART 4 DI Containers DI Container introduction The Autofac DI Container The Simple Injector DI Container The Microsoft.Extensions.DependencyInjection DI Container

The MPS Language Workbench, Volume I (third edition). The first volume of the series is both a simple introduction to the JetBrains MPS language workbench and a complete reference manual. The Meta-Programming System (MPS) is a new kind of tool called a language workbench that simply stated makes it easier and more fun to write programs. With traditional programming, it is common to choose one programming language to solve a problem and being limited by this choice. When working with MPS you can use and combine different languages to solve a problem. You can also create simple languages (e.g., Domain Specific Languages) or extend existing ones when the languages available do not exactly meet the evolving needs of the problem at hand. The languages that you create with MPS will integrate nicely with languages developed by others. MPS is open-source and can be obtained from <http://jetbrains.com/mps> or <http://github.com/JetBrains/MPS>. This book explains the MPS programming paradigm and gradually introduces the reader to the many features of the MPS platform. This book may yet be the simplest way to discover the MPS language workbench and the powerful new approach to programming that this tool offers. The third edition of this book describes MPS 3.3.

Domain-specific Languages

DSLs in Action

Clojure in Action

Proceedings of the 34th Annual Hawaii International Conference on System Sciences

Domain Engineering

Recent Developments

Formal and Practical Aspects of Domain-Specific Languages: Recent Developments

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).

Advances in Computers, Volume 116, presents innovations in computer hardware, software, theory, design, and applications, with this updated volume including new

chapters on Teaching Graduate Students How to Review Research Articles and How to Respond to Reviewer Comments, ALGATOR - An Automatic Algorithm Evaluation System, Graph Grammar Induction, Asymmetric Windows in Digital Signal Processing, Intelligent Agents in Games: Review With an Open-Source Tool, Using Clickstream Data to Enhance Reverse Engineering of Web Applications, and more. Contains novel subject matter that is relevant to computer science Includes the expertise of contributing authors Presents an easy to comprehend writing style

Domain Driven Design is a vision and approach for dealing with highly complex domains that is based on making the domain itself the main focus of the project, and maintaining a software model that reflects a deep understanding of the domain. This book is a short, quickly-readable summary and introduction to the fundamentals of DDD; it does not introduce any new concepts; it attempts to concisely summarize the essence of what DDD is, drawing mostly Eric Evans' original book, as well other sources since published such as Jimmy Nilsson's Applying Domain Driven Design, and various DDD discussion forums. The main topics covered in the book include: Building Domain Knowledge, The Ubiquitous Language, Model Driven Design, Refactoring Toward Deeper Insight, and Preserving Model Integrity. Also included is an interview with Eric Evans on Domain Driven Design today.

This book constitutes the thoroughly refereed post-conference proceedings of the Second International Conference on Software Language Engineering, SLE 2009, held in Denver, CO, USA, in October 2009. The 15 revised full papers and 6 revised short paper presented together with 2 tool demonstration papers were carefully reviewed and selected from 75 initial submissions. The papers are organized in topical sections on language and model evolution, variability and product lines, parsing, compilation, and demo, modularity in languages, and metamodeling and demo.

Domain-Specific Modeling

Research Issues in Engineering and Management

Design and Implementation

Advances in Computers

Second International Conference, SLE 2009, Denver, CO, USA, October 5-6, 2009 Revised Selected Papers

Enabling Full Code Generation

Practical Scala DSLs

Describes ways to incorporate domain modeling into software development.

"[The authors] are pioneers. . . . Few in our industry have their breadth of knowledge and experience." —From the Foreword by Dave Thomas, Bedarra Labs Domain-Specific Modeling (DSM) is the latest approach to software development, promising to greatly increase the speed and ease of software creation. Early adopters of DSM have been enjoying productivity increases of 500-1000% in production for over a decade. This book introduces DSM and offers examples from various fields to illustrate to experienced developers how DSM can improve software development in their teams. Two authorities in the field explain what DSM is, why it works, and how to successfully create and use a DSM solution to improve productivity and quality. Divided into four parts, the book covers: background and motivation; fundamentals; in-depth examples; and creating DSM solutions. There is an emphasis throughout the book on practical guidelines for implementing DSM, including how to identify the necessary language constructs, how to generate full code from models, and how to provide tool support for a new DSM language. The example cases described in the book are available the book's Website, www.dsmbook.com, along with, an evaluation copy of the MetaEdit+ tool (for Windows, Mac OS X, and Linux), which allows readers to examine and try out the modeling languages and code generators. Domain-Specific Modeling is an essential reference for lead developers, software engineers, architects, methodologists, and technical managers who want to learn how to create a DSM solution and successfully put it into practice.

When carefully selected and used, Domain-Specific Languages (DSLs) may simplify complex code, promote effective communication with customers, improve productivity, and unclog development bottlenecks. In Domain-Specific Languages , noted software development expert Martin Fowler first provides the information software professionals need to decide if and when to utilize DSLs. Then, where DSLs prove suitable, Fowler presents effective techniques for building them, and guides software engineers in choosing the right approaches for their applications. This book's techniques may be utilized with most modern object-oriented languages; the author provides numerous examples in Java and C#, as well as selected examples in Ruby. Wherever possible, chapters are organized to be self-standing, and most reference topics are presented in a familiar patterns format. Armed with this wide-ranging book, developers will have the knowledge they need to make important decisions about DSLs—and, where appropriate, gain the significant technical and business benefits they offer. The topics covered include: How DSLs compare to frameworks and libraries, and when those alternatives are sufficient Using parsers and parser generators, and parsing external DSLs Understanding, comparing, and choosing DSL language constructs Determining whether to use code generation, and comparing code generation strategies Previewing new language workbench tools for creating DSLs

This book constitutes the refereed proceedings of the 8th International Conference, MLDM 2012, held in Berlin, Germany in July 2012. The 51 revised full papers presented were carefully reviewed and selected from 212 submissions. The topics range from theoretical topics for classification, clustering, association rule and pattern mining to specific data mining methods for the different multimedia data types such as image mining, text mining, video mining and web mining.

Hands-On Enterprise Automation with Python

DSLs in Boo

Designing, Implementing and Using Domain-specific Languages

Real-World Applications Using Domain Specific Languages

Abstracts and CD-ROM of Full Papers : January 3-6, 2001, Maui, Hawaii

Clojure for Domain-specific Languages

Advanced Approaches

Learn to build configuration file readers, data readers, model-driven code generators, source-to-source translators, source analyzers, and interpreters. You don't need a background in computer science--ANTLR creator Terence Parr demystifies language implementation by breaking it down into the most common design patterns. Pattern by pattern, you'll learn the key skills you need to implement your own computer languages. Knowing how to create domain-specific languages (DSLs) can give you a huge productivity boost. Instead of writing code in a general-purpose programming language, you can first build a custom language tailored to make you efficient in a particular domain. The key is understanding the common patterns found across language implementations. Language Design Patterns identifies and condenses the most common design patterns, providing sample implementations of each. The pattern implementations use Java, but the patterns themselves are completely general. Some of the implementations use the well-known ANTLR parser generator, so readers will find this book an excellent source of ANTLR examples as well. But this book will benefit anyone interested in implementing languages, regardless of their tool of choice. Other language implementation books focus on compilers, which you rarely need in your daily life. Instead, Language Design Patterns shows you patterns you can use for all kinds of language applications. You'll learn to create configuration file readers, data readers, model-driven code generators, source-to-source translators, source analyzers, and interpreters. Each chapter groups related design patterns and, in each pattern, you'll get hands-on experience by building a complete sample implementation. By the time you finish the book, you'll know how to solve most common language implementation problems.

This tutorial book presents an augmented selection of material presented at the International Summer School on Generative and Transformational Techniques in Software Engineering, GTTSE 2005. The book comprises 7 tutorial lectures presented together with 8 technology presentations and 6 contributions to the participants workshop. The tutorials combine foundations, methods, examples, and tool support. Subjects covered include feature-oriented programming and the AHEAD tool suite; program transformation with reflection and aspect-oriented programming, and more.

Domain-Specific Languages Pearson Education

Extend and enhance your Java applications with domain-specific scripting in Groovy About This Book- Build domain-specific mini languages in Groovy that integrate seamlessly with your Java apps with this hands-on guide- Increase stakeholder participation in the development process with domain-specific scripting in Groovy- Get up to speed with the newest features in Groovy using this second edition and integrate Groovy-based DSLs into your existing Java applications. Who This Book Is For This book is for Java software developers who have an interest in building domain scripting into their Java applications. No knowledge of Groovy is required, although it will be helpful. This book does not teach Groovy, but quickly introduces the basic ideas of Groovy. An experienced Java developer should have no problems with these and move quickly on to the more involved aspects of creating DSLs with Groovy. No experience of creating a DSL is required. What You Will Learn- Familiarize yourself with Groovy scripting and work with Groovy closures- Use the meta-programming features in Groovy to build mini languages- Employ Groovy mark-up and builders to simplify application development- Familiarize yourself with Groovy mark-up and build your own Groovy builders- Build effective DSLs with operator overloading, command chains, builders, and a host of other Groovy language features- Integrate Groovy with your Java and JVM based applications In Detail The times when developing on the JVM meant you were a Java programmer have long passed. The JVM is now firmly established as a polyglot development environment with many projects opting for alternative development languages to Java such as Groovy, Scala, Clojure, and JRuby. In this pantheon of development languages, Groovy stands out for its excellent DSL enabling features which allows it to be manipulated to produce mini languages that are tailored to a project's needs. A comprehensive tutorial on designing and developing mini Groovy based Domain Specific Languages, this book will guide you through the development of several mini DSLs that will help you gain all the skills needed to develop your own Groovy based DSLs with confidence and ease. Starting with the bare basics, this book will focus on how Groovy can be used to construct domain specific mini languages, and will go through the more complex meta-programming features of Groovy, including using the Abstract Syntax Tree (AST). Practical examples are used throughout this book to de-mystify these seemingly complex language features and to show how they can be used to create simple and elegant DSLs. Packed with examples, including several fully worked DSLs, this book will serve as a springboard for developing your own DSLs. Style and approach This book is a hands-on guide that will walk you through examples for building DSLs with Groovy rather than just talking about "metaprogramming with Groovy". The examples in this book have been designed to help you gain a good working knowledge of the techniques involved and apply these to producing your own Groovy based DSLs.

Build Your Own Programming Language

Biomedical Natural Language Processing

Globalizing Domain-Specific Languages

with JetBrains MPS

Volume I

Variable Domain-specific Software Languages with DjDSL

Product Lines, Languages, and Conceptual Models

Your success—and sanity—are closer at hand when you work at a higher level of abstraction, allowing your attention to be on the business problem rather than the details of the

programming platform. Domain Specific Languages—"little languages" implemented on top of conventional programming languages—give you a way to do this because they model the domain of your business problem. DSLs in Action introduces the concepts and definitions a developer needs to build high-quality domain specific languages. It provides a solid foundation to the usage as well as implementation aspects of a DSL, focusing on the necessity of applications speaking the language of the domain. After reading this book, a programmer will be able to design APIs that make better domain models. For experienced developers, the book addresses the intricacies of domain language design without the pain of writing parsers by hand. The book discusses DSL usage and implementations in the real world based on a suite of JVM languages like Java, Ruby, Scala, and Groovy. It contains code snippets that implement real world DSL designs and discusses the pros and cons of each implementation. 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. What's Inside Tested, real-world examples How to find the right level of abstraction Using language features to build internal DSLs Designing parser/combinator-based little languages

Invent your own Python scripts to automate your infrastructure Key Features Make the most of Python libraries and modules to automate your infrastructure Leverage Python programming to automate server configurations and administration tasks Efficiently develop your Python skill set Book Description Hands-On Enterprise Automation with Python starts by covering the set up of a Python environment to perform automation tasks, as well as the modules, libraries, and tools you will be using. We ' ll explore examples of network automation tasks using simple Python programs and Ansible. Next, we will walk you through automating administration tasks with Python Fabric, where you will learn to perform server configuration and administration, along with system administration tasks such as user management, database management, and process management. As you progress through this book, you ' ll automate several testing services with Python scripts and perform automation tasks on virtual machines and cloud infrastructure with Python. In the concluding chapters, you will cover Python-based offensive security tools and learn how to automate your security tasks. By the end of this book, you will have mastered the skills of automating several system administration tasks with Python. What you will learn Understand common automation modules used in Python Develop Python scripts to manage network devices Automate common Linux administration tasks with Ansible and Fabric Managing Linux processes Administrate VMware, OpenStack, and AWS instances with Python Security automation and sharing code on GitHub Who this book is for Hands-On Enterprise Automation with Python is for system administrators and DevOps engineers who are looking for an alternative to major automation frameworks such as Puppet and Chef. Basic programming knowledge with Python and Linux shell scripting is necessary.

This book is a practical tutorial, walking the reader through examples of building DSLs with Groovy covering meta-programming with Groovy. Some complex concepts are covered in the book but we go through these in a clear and methodically way so that readers will gain a good working knowledge of the techniques involved. This book is for Java software developers who have an interest in building domain scripting into their Java applications. No knowledge of Groovy is required, although it will be helpful. The book does not teach Groovy, but quickly introduces the basic ideas of Groovy. An experienced Java developer should have no problems with these and move quickly on to the more involved aspects of creating DSLs with Groovy. No experience of creating a DSL is required. The book should also be useful for experienced Groovy developers who have so far only used Groovy DSLs such as Groovy builders and would like to start building their own Groovy-based DSLs.

Domain engineering is a set of activities intended to develop, maintain, and manage the creation and evolution of an area of knowledge suitable for processing by a range of software systems. It is of considerable practical significance, as it provides methods and techniques that help reduce time-to-market, development costs, and project risks on one hand, and helps improve system quality and performance on a consistent basis on the other. In this book, the editors present a collection of invited chapters from various fields related to domain engineering. The individual chapters present state-of-the-art research and are organized in three parts. The first part focuses on results that deal with domain engineering in software product lines. The second part describes how domain-specific languages are used to support the construction and deployment of domains. Finally, the third part presents contributions dealing with domain engineering within the field of conceptual modeling. All chapters utilize a similar terminology, which will help readers to understand and relate to the chapters content. The book will be especially rewarding for researchers and students of software engineering methodologies in general and of domain engineering and its related fields in particular, as it contains the most comprehensive and up-to-date information on this topic.

Automate common administrative and security tasks with Python

8th International Conference, MLDM 2012, Berlin, Germany, July 13-20, 2012, Proceedings

Domain-Specific Languages in Practice

IFIP TC 2 Working Conference, DSL 2009, Oxford, UK, July 15-17, 2009, Proceedings

A programmer's guide to designing compilers, interpreters, and DSLs for solving modern computing problems

Implementing Domain-Specific Languages with Xtext and Xtend

Groovy for Domain-specific Languages

This book covers research into the most important practices in product line organization. Contributors offer experience-based knowledge on the domain and application engineering management of variability, and the design and use of tools to support the management of product line-related knowledge.

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 specialized for a particular application domain. By incorporating knowledge about that domain, DSLs can lead to more concise and more analyzable programs, better code 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 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 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 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 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 Spoofox. Part IV DSLs and Software Engineering: 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 in HTML version (the one your are looking at) and as a PDF. For details see the book's companion website at <http://dslbook.org>

"This book presents current research on all aspects of domain-specific language for scholars and practitioners in the software engineering fields, providing new results and answering research"--

Summary A fully revised edition that covers the new features available in Clojure 1.6. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Technology Clojure is a modern Lisp for the JVM. It has the strengths you expect: first-class functions, macros, and Lisp's clean programming style. It supports functional programming, concurrent programming and for creating domain-specific languages. Clojure lets you solve harder problems, make faster changes, and end up with a smaller code base. It's no wonder Clojure success stories. About the Book Clojure in Action, Second Edition is an expanded and improved version that's been updated to cover the new features of Clojure 1.6. The book is an introduction to the Clojure language, moving from abstract theory to practical examples. You'll start by learning how to use Clojure as a general-purpose language. Next, you'll explore the concurrency model, based on the database concept of Software Transactional Memory (STM). You'll gain a new level of productivity through Clojure DSLs that can run on the JVM. The book contains countless tips, tricks, and techniques for writing smaller, safer, and faster code. What's Inside Functional programming basics Metaprogramming with Clojure's macros Interoperating with Java 1.6 About the Reader Assumes readers are familiar with a programming language like C, Java, Ruby, or Python. Table of Contents Introducing Clojure Clojure elements: Data structures, macros, blocks of Clojure Multimethod polymorphism Exploring Clojure and Java interop State and the concurrent world Evolving Clojure through macros More on functional programming Practical DSL types Test-driven development and more More macros and DSL

The MPS Language Workbench

Programming DSLs in Kotlin

Tackling Complexity in the Heart of Software

Creating Domain-Specific Languages Using Metamodels

Modern Software Engineering Concepts and Practices: Advanced Approaches

Domain-driven Design

Dependency Injection Principles, Practices, and Patterns

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.

Creating your own domain-specific languages (DSLs) is both challenging and exhilarating. DSLs give users a way to interact with your applications more effectively, and Kotlin is a fantastic language to serve as a host for internal DSLs, because it greatly reduces the pain and effort of design and development. But implementing DSLs on top of Kotlin requires understanding the key strengths of the language and knowing how to apply them appropriately. Learn to avoid the pitfalls and leverage the language while creating your own elegant, fluent, concise, and robust DSLs using Kotlin. Internal DSLs remove the burdens of implementing a full blown language compiler. The host language quickly becomes your ally to creating DSLs, but the syntax you can choose for your DSLs is limited to what the host language allows. You can work around the limitations by tactfully bending the rules and exploiting the language capabilities. Learn the power of Kotlin and ways to design with it, in the context of crafting internal DSLs Start by learning ways to exploit the flexibilities of Kotlin to make your DSLs fluent, expressive, and concise. Then pick up techniques to extend the language with domain specific properties and functions. Quickly move ahead to tie your DSL snippets into the runtime environment and context of execution of your applications. Design to prevent any non-sensical syntax in your DSL that may otherwise be valid in the host language. Finally, learn techniques to gracefully handle errors. Practice using the multiple examples that are included in each chapter. Fire up your editor and follow along each example to become proficient in designing and implementing your own internal DSLs using Kotlin. What You Need: Kotlin version 1.3 or later and your favorite Kotlin IDE or code editor.

Build domain specific languages (DSLs) using Java's most popular functional programming language: Scala. This book introduces the basics of Scala and DSLs using a series of practical examples. In

Practical Scala DSLs, you'll learn to create pragmatic and complete code examples that explain the actual use of DSLs with Scala: a web API and microservices; a custom language; a mobile app; a Forex system; a game; and cloud applications. At the end of this unique book, you'll be able to describe the differences between external and internal DSLs; understand when and how to apply DSLs; create DSLs using Scala; and even create a DSL using another programming language. What You'll Learn Build DSLs in Scala Write a web API and microservices Create a custom language Apply DSLs to mobile apps development, a Forex trading system, game development, and more Discover the role of DSLs in cloud development Integrate DSLs as part of a DevOps program or structure Build internal and external DSLs Who This Book Is For Experienced Java coders with at least some prior experience with Scala. You may be new to DSLs.

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.

Groovy for Domain-Specific Languages - Second Edition

Systems, Architectures, Modeling, and Simulation

International Dagstuhl Seminar, Dagstuhl Castle, Germany, October 5-10, 2014, Revised Papers

Domain-Specific Development with Visual Studio DSL Tools

Create Your Own Domain-Specific and General Programming Languages

DSL Engineering

Software Language Engineering

Martin Fowler's breakthrough practitioner-oriented book on Domain Specific Languages - will do for DSLs what Fowler did for refactoring! * *Fowler's highly anticipated introduction to DSLs: a category-defining book by one of the software world's most influential authors. *Two books in one: a concise narrative that introduces DSLs, and a larger reference that shows how to plan and develop them. *Helps software professionals reduce the cost and complexity of building DSLs - so they can take full advantage of them. Domain Specific Languages (DSLs) offer immense promise for software engineers who need better, faster ways to solve problems of specific types, or in specific areas or industries. DSLs have been around for several years, and have begun to grow in popularity. Now, Martin Fowler - one of the world's most influential software engineering authors - has written the first practitioner-oriented book about them. Fowler's legendary book, Refactoring, made software refactoring a crucial tool for software engineers worldwide; this book will do the same for DSLs. Fowler has designed Domain Specific Languages as two books in one. The first --a narrative designed to be read from 'cover to cover' - offers a concise introduction to DSLs, how they are implemented, and what are useful for. Next, Fowler thoroughly introduces today's most effective techniques for building DSLs. Fowler covers both 'external' and 'internal' DSLs, as well as alternative computational models, code generation, common parser topics, and much more. He provides extensive Java and C# examples throughout, as well as selected Ruby examples for concepts that can best be explained using a dynamic language. Together, both sections enable readers to make wellinformed choices about whether to use a DSL in their work, and which techniques to employ in order to build DSLs more quickly and cost-effectively.

Written by the creator of the Unicon programming language, this book will show you how to implement programming languages to reduce the time and cost of creating applications for new or specialized areas of computing Key FeaturesReduce development time and solve pain points in your application domain by building a custom programming languageLearn how to create parsers, code generators, file readers, analyzers, and interpretersCreate an alternative to frameworks and libraries to solve domain-specific problemsBook Description The need for different types of computer languages is growing rapidly and developers prefer creating domain-specific languages for solving specific application domain problems. Building your own programming language has its advantages. It can be your antidote to the ever-increasing size and complexity of software. In this book, you'll start with implementing the frontend of a compiler for your language, including a lexical analyzer and parser. The book covers a series of traversals of syntax trees, culminating with code generation for a bytecode virtual machine. Moving ahead, you'll learn how domain-specific language features are often best represented by operators and functions that are built into the language, rather than library functions. We'll conclude with how to implement garbage collection, including reference counting and mark-and-sweep garbage collection. Throughout the book, Dr. Jeffery weaves in his experience of building the Unicon programming language to give better context to the concepts where relevant examples are provided in both Unicon and Java so that you can follow the code of your choice of either a very high-level language with advanced features, or a mainstream language. By the end of this book, you'll be able to build and deploy your own domain-specific languages, capable of compiling and running programs. What you will learnPerform requirements analysis for the new language and design language syntax and semanticsWrite lexical and context-free grammar rules for common expressions and control structuresDevelop a scanner that reads source code and generate a parser that checks syntaxBuild key data structures in a compiler and use your compiler to build a syntax-coloring code editorImplement a bytecode interpreter and run bytecode generated by your compilerWrite tree traversals that insert information into the syntax treeImplement garbage collection in your languageWho this book is for This book is for software developers interested in the idea of inventing their own language or developing a domain-specific language. Computer science students taking compiler construction courses will also find this book highly useful as a practical guide to language implementation to supplement more theoretical textbooks. Intermediate-level knowledge and experience working with a high-level language such as Java or the C++ language are expected to help you get the most out of this book.

Software engineering has advanced rapidly in recent years in parallel with the complexity and scale of software systems. New requirements in software systems yield innovative approaches that are developed either through introducing new paradigms or extending the capabilities of well-established approaches. Modern Software Engineering Concepts and Practices: Advanced Approaches provides emerging theoretical approaches and their practices. This book includes case studies and real-world practices and presents a range of advanced approaches to reflect various perspectives in the discipline.

Extend and enhance your Java applications with domain-specific scripting in Groovy About This Book Build domain-specific mini languages in Groovy that integrate seamlessly with your Java apps with this hands-on guide Increase stakeholder participation in the development process with domain-specific scripting in Groovy Get up to speed with the newest features in Groovy using

this second edition and integrate Groovy-based DSLs into your existing Java applications. Who This Book Is For This book is for Java software developers who have an interest in building domain scripting into their Java applications. No knowledge of Groovy is required, although it will be helpful. This book does not teach Groovy, but quickly introduces the basic ideas of Groovy. An experienced Java developer should have no problems with these and move quickly on to the more involved aspects of creating DSLs with Groovy. No experience of creating a DSL is required. **What You Will Learn** Familiarize yourself with Groovy scripting and work with Groovy closures Use the meta-programming features in Groovy to build mini languages Employ Groovy mark-up and builders to simplify application development Familiarize yourself with Groovy mark-up and build your own Groovy builders Build effective DSLs with operator overloading, command chains, builders, and a host of other Groovy language features Integrate Groovy with your Java and JVM based applications In Detail The times when developing on the JVM meant you were a Java programmer have long passed. The JVM is now firmly established as a polyglot development environment with many projects opting for alternative development languages to Java such as Groovy, Scala, Clojure, and JRuby. In this pantheon of development languages, Groovy stands out for its excellent DSL enabling features which allows it to be manipulated to produce mini languages that are tailored to a project's needs. A comprehensive tutorial on designing and developing mini Groovy based Domain Specific Languages, this book will guide you through the development of several mini DSLs that will help you gain all the skills needed to develop your own Groovy based DSLs with confidence and ease. Starting with the bare basics, this book will focus on how Groovy can be used to construct domain specific mini languages, and will go through the more complex meta-programming features of Groovy, including using the Abstract Syntax Tree (AST). Practical examples are used throughout this book to de-mystify these seemingly complex language features and to show how they can be used to create simple and elegant DSLs. Packed with examples, including several fully worked DSLs, this book will serve as a springboard for developing your own DSLs. **Style and approach** This book is a hands-on guide that will walk you through examples for building DSLs with Groovy rather than just talking about "metaprogramming with Groovy". The examples in this book have been designed to help you gain a good working knowledge of the techniques involved and apply these to producing your own Groovy based DSLs.

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Formal and Practical Aspects of Domain-specific Languages

Domain-Specific Processors

Machine Learning and Data Mining in Pattern Recognition

Software Product Lines

Extend and Enhance Your Java Applications with Domain-specific Languages in Groovy

An example-oriented approach to develop custom domain-specific languages. If you've already developed a few Clojure applications and wish to expand your knowledge on Clojure or domain-specific languages in general, then this book is for you. If you're an absolute Clojure beginner, then you may only find the detailed examples of the core Clojure components of value. If you've developed DSLs in other languages, this Lisp and Java-based book might surprise you with the power of Clojure.

Software practitioners are rapidly discovering the immense value of Domain-Specific Languages (DSLs) in solving problems within clearly definable problem domains. Developers are applying DSLs to improve productivity and quality in a wide range of areas, such as finance, combat simulation, macro scripting, image generation, and more. But until now, there have been few practical resources that explain how DSLs work and how to construct them for optimal use. Software Language Engineering fills that need. Written by expert DSL consultant Anneke Kleppe, this is the first comprehensive guide to successful DSL design. Kleppe systematically introduces and explains every ingredient of an effective language specification, including its description of concepts, how those concepts are denoted, and what those concepts mean in relation to the problem domain. Kleppe carefully illuminates good design strategy, showing how to maximize the flexibility of the languages you create. She also demonstrates powerful techniques for creating new DSLs that cooperate well with general-purpose languages and leverage their power. Completely tool-independent, this book can serve as the primary resource for readers using Microsoft DSL tools, the Eclipse Modeling Framework, openArchitectureWare, or any other DSL toolset. It contains multiple examples, an illustrative running case study, and insights and background information drawn from Kleppe's leading-edge work as a DSL researcher. Specific topics covered include Discovering the types of problems that DSLs can solve, and when to use them Comparing DSLs with general-purpose languages, frameworks, APIs, and other approaches Understanding the roles and tools available to language users and engineers Creating each component of a DSL specification Modeling both concrete and abstract syntax Understanding and describing language semantics Defining textual and visual languages based on object-oriented metamodeling and graph transformations Using metamodels and associated tools to generate grammars Integrating object-oriented modeling with graph theory Building code generators for new languages Supporting multilanguage models and programs This book provides software engineers with all the guidance they need to create DSLs that solve real problems more rapidly, and with higher-quality code. The development of modern complex software-intensive systems often involves the use of multiple DSMLs that capture different system aspects. Supporting coordinated use of DSMLs leads to what we call the globalization of modeling languages, that is, the use of multiple modeling languages to support coordinated development of diverse aspects of a system. In this book, a number of articles describe the vision and the way globalized DSMLs currently assist integrated DSML support teams working on systems that span many domains and concerns to determine how their work on a particular aspect influences work on other aspects. Globalized DSMLs offer support for communicating relevant information,

and for coordinating development activities and associated technologies within and across teams, in addition to providing support for imposing control over development artifacts produced by multiple teams. DSMLs can be used to support socio-technical coordination by providing the means for stakeholders to bridge the gap between how they perceive a problem and its solution, and the programming technologies used to implement a solution. They also support coordination of work across multiple teams. DSMLs developed in an independent manner to meet the specific needs of domain experts have an associated framework that regulates interactions needed to support collaboration and work coordination across different system domains. The articles in the book describe how multiple heterogeneous modeling languages (or DSMLs) can be related to determine how different aspects of a system influence each other. The book includes a research roadmap that broadens the current DSML research focus beyond the development of independent DSMLs to one that provides support for globalized DSMLs.

Learn how to implement a DSL with Xtext and Xtend using easy-to-understand examples and best practices About This Book Leverage the latest features of Xtext and Xtend to develop a domain-specific language. Integrate Xtext with popular third party IDEs and get the best out of both worlds. Discover how to test a DSL implementation and how to customize runtime and IDE aspects of the DSL Who This Book Is For This book is targeted at programmers and developers who want to create a domain-specific language with Xtext. They should have a basic familiarity with Eclipse and its functionality. Previous experience with compiler implementation can be helpful but is not necessary since this book will explain all the development stages of a DSL. What You Will Learn Write Xtext grammar for a DSL; Use Xtend as an alternative to Java to write cleaner, easier-to-read, and more maintainable code; Build your Xtext DSLs easily with Maven/Tycho and Gradle; Write a code generator and an interpreter for a DSL; Explore the Xtext scoping mechanism for symbol resolution; Test most aspects of the DSL implementation with JUnit; Understand best practices in DSL implementations with Xtext and Xtend; Develop your Xtext DSLs using Continuous Integration mechanisms; Use an Xtext editor in a web application In Detail Xtext is an open source Eclipse framework for implementing domain-specific languages together with IDE functionalities. It lets you implement languages really quickly; most of all, it covers all aspects of a complete language infrastructure, including the parser, code generator, interpreter, and more. This book will enable you to implement Domain Specific Languages (DSL) efficiently, together with their IDE tooling, with Xtext and Xtend. Opening with brief coverage of Xtext features involved in DSL implementation, including integration in an IDE, the book will then introduce you to Xtend as this language will be used in all the examples throughout the book. You will then explore the typical programming development workflow with Xtext when we modify the grammar of the DSL. Further, the Xtend programming language (a fully-featured Java-like language tightly integrated with Java) will be introduced. We then explain the main concepts of Xtext, such as validation, code generation, and customizations of runtime and UI aspects. You will have learned how to test a DSL implemented in Xtext with JUnit and will progress to advanced concepts such as type checking and scoping. You will then integrate the typical Continuous Integration systems built in to Xtext DSLs and familiarize yourself with Xbase. By the end of the book, you will manually maintain the EMF model for an Xtext DSL and will see how an Xtext DSL can also be used in IntelliJ. Style and approach A step-by step-tutorial with illustrative examples that will let you master using Xtext and implementing DSLs with its custom language, Xtend.