

# Refactoring For Software Design Smells

Stefano Violetta

**Refactoring for Software Design Smells** Girish Suryanarayana, Ganesh Samarthyam, Tushar Sharma, 2014-10-31 Awareness of design smells – indicators of common design problems – helps developers or software engineers understand mistakes made while designing, what design principles were overlooked or misapplied, and what principles need to be applied properly to address those smells through refactoring. Developers and software engineers may know principles and patterns, but are not aware of the smells that exist in their design because of wrong or mis-application of principles or patterns. These smells tend to contribute heavily to technical debt – further time owed to fix projects thought to be complete – and need to be addressed via proper refactoring. Refactoring for Software Design Smells presents 25 structural design smells, their role in identifying design issues, and potential refactoring solutions. Organized across common areas of software design, each smell is presented with diagrams and examples illustrating the poor design practices and the problems that result, creating a catalog of nuggets of readily usable information that developers or engineers can apply in their projects. The authors distill their research and experience as consultants and trainers, providing insights that have been used to improve refactoring and reduce the time and costs of managing software projects. Along the way they recount anecdotes from actual projects on which the relevant smell helped address a design issue. Contains a comprehensive catalog of 25 structural design smells (organized around four fundamental design principles) that contribute to technical debt in software projects Presents a unique naming scheme for smells that helps understand the cause of a smell as well as point toward its potential refactoring Includes illustrative examples that showcase the poor design practices underlying a smell and the problems that result Covers pragmatic techniques for refactoring design smells to manage technical debt and to create and maintain high-quality software in practice Presents insightful anecdotes and case studies drawn from the trenches of real-world projects

**Refactoring** Martin Fowler, Kent Beck, 1999 Refactoring is gaining momentum amongst the object oriented programming community. It can transform the internal dynamics of applications and has the capacity to transform bad code into good code. This book offers an introduction to refactoring.

Refactoring to Patterns Joshua Kerievsky, 2004-08-05 In 1994, Design Patterns changed the landscape of object-oriented development by introducing classic solutions to recurring design problems. In 1999, Refactoring revolutionized design by introducing an effective process for improving code. With the highly anticipated Refactoring to Patterns, Joshua Kerievsky has changed our approach to design by forever uniting patterns with the evolutionary process of refactoring. This book introduces the theory and practice of pattern-directed refactorings: sequences of low-level refactorings that allow designers to safely move designs to, towards, or away from pattern implementations. Using code from real-world projects, Kerievsky documents the thinking and steps underlying over two dozen pattern-based design transformations. Along the way he offers insights into pattern differences and how to implement patterns in the simplest possible ways. Coverage includes: A catalog of twenty-seven pattern-directed refactorings, featuring real-world code examples Descriptions of twelve design smells that indicate the need for this book's refactorings General information and new insights about patterns and refactoring Detailed implementation mechanics: how low-level refactorings are combined to implement high-level patterns Multiple ways to implement the same pattern—and when to use each Practical ways to get started even if you have little experience with patterns or refactoring Refactoring to Patterns reflects three years of refinement and the insights of more than sixty software engineering thought leaders in the global patterns, refactoring, and agile development communities. Whether you're focused on legacy or "greenfield" development, this book will make you a better software designer by helping you learn how to make important design changes safely and effectively.

**Refactoring in Large Software Projects** Martin Lippert, Stephen Roock, 2006-05-01 Large Refactorings looks at methods of establish design improvements as an important and independent activity during development of software, and will help to ensure that software continues to adapt, improve and remain easy to read and modify without altering its observable behaviour. It provides real-world experience from real refactored projects and shows how to refactor software to ensure that it is efficient, fresh and adaptable.

Refactoring Martin Fowler, 2018-11-20 Martin Fowler's guide to reworking bad code into well-structured code Refactoring improves the design of existing code and enhances software maintainability, as well as making existing code easier to understand. Original Agile Manifesto signer and software development thought leader, Martin Fowler, provides a catalog of refactorings that explains why you should refactor; how to recognize code that needs refactoring; and how to actually do it successfully, no matter what language you use. Refactoring principles: understand the process and general principles of refactoring Code smells: recognize "bad smells" in code that signal opportunities to refactor Application improvement: quickly apply useful refactorings to make a program easier to comprehend and change Building tests: writing good tests increases a programmer's effectiveness Moving features: an important part of refactoring is moving elements between contexts Data structures: a collection of refactorings to organize data, an important role in programs Conditional Logic: use refactorings to make conditional sections easier to understand APIs: modules and their functions are the building blocks of our software, and APIs are the joints that we use to plug them together Inheritance: it is both very useful and easy to misuse, and it's often hard to see the misuse until it's in the rear-view mirror---refactorings can fix the misuse Examples are written in JavaScript, but you shouldn't find it difficult to adapt the refactorings to whatever language you are currently using as they look mostly the same in different languages. Whenever you read [Refactoring], it's time to read it again. And if you haven't read it yet, please do before writing another line of code. –David Heinemeier Hansson, Creator of Ruby on Rails, Founder & CTO at Basecamp "Any fool can write code that a computer can understand. Good programmers write code that humans can understand." –M. Fowler (1999)

Refactoring Workbook William C. Wake, 2004 & Most software practitioners deal with inherited code; this book teaches them how to optimize it & & Workbook approach facilitates the learning process & & Helps you identify where problems in a software application exist or are likely to exist

**Refactoring HTML** Elliotte Rusty Harold, 2012-03-16 Like any other software system, Web sites gradually accumulate "cruft" over time. They slow down. Links break. Security and compatibility problems mysteriously appear. New features don't integrate seamlessly. Things just don't work as well. In an ideal world, you'd rebuild from scratch. But you can't: there's no time or money for that. Fortunately, there's a solution: You can refactor your Web code using easy, proven techniques, tools,

and recipes adapted from the world of software development. In Refactoring HTML, Elliotte Rusty Harold explains how to use refactoring to improve virtually any Web site or application. Writing for programmers and non-programmers alike, Harold shows how to refactor for better reliability, performance, usability, security, accessibility, compatibility, and even search engine placement. Step by step, he shows how to migrate obsolete code to today's stable Web standards, including XHTML, CSS, and REST—and eliminate chronic problems like presentation-based markup, stateful applications, and “tag soup.” The book's extensive catalog of detailed refactorings and practical “recipes for success” are organized to help you find specific solutions fast, and get maximum benefit for minimum effort. Using this book, you can quickly improve site performance now—and make your site far easier to enhance, maintain, and scale for years to come. Topics covered include • Recognizing the “smells” of Web code that should be refactored • Transforming old HTML into well-formed, valid XHTML, one step at a time • Modernizing existing layouts with CSS • Updating old Web applications: replacing POST with GET, replacing old contact forms, and refactoring JavaScript • Systematically refactoring content and links • Restructuring sites without changing the URLs your users rely upon This book will be an indispensable resource for Web designers, developers, project managers, and anyone who maintains or updates existing sites. It will be especially helpful to Web professionals who learned HTML years ago, and want to refresh their knowledge with today's standards-compliant best practices. This book will be an indispensable resource for Web designers, developers, project managers, and anyone who maintains or updates existing sites. It will be especially helpful to Web professionals who learned HTML years ago, and want to refresh their knowledge with today's standards-compliant best practices.

**Refactoring** Jay Fields, Shane Harvie, Martin Fowler, Kent Beck, 2009-10-15 The Definitive Refactoring Guide, Fully Revamped for Ruby With refactoring, programmers can transform even the most chaotic software into well-designed systems that are far easier to evolve and maintain. What's more, they can do it one step at a time, through a series of simple, proven steps. Now, there's an authoritative and extensively updated version of Martin Fowler's classic refactoring book that utilizes Ruby examples and idioms throughout—not code adapted from Java or any other environment. The authors introduce a detailed catalog of more than 70 proven Ruby refactorings, with specific guidance on when to apply each of them, step-by-step instructions for using them, and example code illustrating how they work. Many of the authors' refactorings use powerful Ruby-specific features, and all code samples are available for download. Leveraging Fowler's original concepts, the authors show how to perform refactoring in a controlled, efficient, incremental manner, so you methodically improve your code's structure without introducing new bugs. Whatever your role in writing or maintaining Ruby code, this book will be an indispensable resource. This book will help you Understand the core principles of refactoring and the reasons for doing it Recognize “bad smells” in your Ruby code Rework bad designs into well-designed code, one step at a time Build tests to make sure your refactorings work properly Understand the challenges of refactoring and how they can be overcome Compose methods to package code properly Move features between objects to place responsibilities where they fit best Organize data to make it easier to work with Simplify conditional expressions and make more effective use of polymorphism Create interfaces that are easier to understand and use Generalize more effectively Perform larger refactorings that transform entire software systems and may take months or years Successfully refactor Ruby on Rails code

**A Philosophy of Software Design** John Ousterhout, 2018-04-10

**Software Development, Design and Coding** John F. Dooley, 2017-11-25 Learn the principles of good software design, and how to turn those principles into great code. This book introduces you to software engineering – from the application of engineering principles to the development of software. You'll see how to run a software development project, examine the different phases of a project, and learn how to design and implement programs that solve specific problems. It's also about code construction – how to write great programs and make them work. Whether you're new to programming or have written hundreds of applications, in this book you'll re-examine what you already do, and you'll investigate ways to improve. Using the Java language, you'll look deeply into coding standards, debugging, unit testing, modularity, and other characteristics of good programs. With Software Development, Design and Coding, author and professor John Dooley distills his years of teaching and development experience to demonstrate practical techniques for great coding. What You'll Learn Review modern agile methodologies including Scrum and Lean programming Leverage the capabilities of modern computer systems with parallel programming Work with design patterns to exploit application development best practices Use modern tools for development, collaboration, and source code controls Who This Book Is For Early career software developers, or upper-level students in software engineering courses

**Agile Software Architecture** Michael Stal, 2013-11-27 This chapter describes how to systematically prevent software architecture erosion by applying refactoring techniques. Software architecture modifications are common rather than the exception in software development. Modifications come in different flavors, such as redefining or adding requirements, changing infrastructure and technology, or causing changes by bugs and incorrect decisions. But no matter where these changes originate, they need special attention from software architects. Otherwise, if software architects merely focus on adding new features—(changes or extensions that by themselves might not be adequate), design erosion will be the final result. In a systematic approach, software architects evaluate the existing software design before adding new artifacts or changing existing ones. Whenever they identify architecture problems, they immediately resolve architectural issues, thus assuring high quality and sustainability. Software architecture refactoring enables such iterative architecture improvement. It consists of indentifying problems, applying the right refactorings, and testing the results. Architecture refactoring is often combined with code refactoring activities to add the best value. Refactoring patterns offer proven solutions for recurring architectural problems, hence providing a toolset to software engineers.

**Managing Technical Debt** Philippe Kruchten, Ipek Ozkaya, 2019-04-15 “This is an incredibly wise and useful book. The authors have considerable real-world experience in delivering quality systems that matter, and their expertise shines through in these pages. Here you will learn what technical debt is, what is it not, how to manage it, and how to pay it down in responsible ways. This is a book I wish I had when I was just beginning my career. The authors present a myriad of case studies, born from years of experience, and offer a multitude of actionable insights for how to apply it to your project.” –Grady Booch, IBM Fellow Master Best Practices for Managing Technical Debt to Promote Software Quality and Productivity As software systems mature, earlier design or code decisions made in the context of budget or

schedule constraints increasingly impede evolution and innovation. This phenomenon is called technical debt, and practical solutions exist. In *Managing Technical Debt*, three leading experts introduce integrated, empirically developed principles and practices that any software professional can use to gain control of technical debt in any software system. Using real-life examples, the authors explain the forms of technical debt that afflict software-intensive systems, their root causes, and their impacts. They introduce proven approaches for identifying and assessing specific sources of technical debt, limiting new debt, and “paying off” debt over time. They describe how to establish managing technical debt as a core software engineering practice in your organization. Discover how technical debt damages manageability, quality, productivity, and morale—and what you can do about it Clarify root causes of debt, including the linked roles of business goals, source code, architecture, testing, and infrastructure Identify technical debt items, and analyze their costs so you can prioritize action Choose the right solution for each technical debt item: eliminate, reduce, or mitigate Integrate software engineering practices that minimize new debt *Managing Technical Debt* will be a valuable resource for every software professional who wants to accelerate innovation in existing systems, or build new systems that will be easier to maintain and evolve.

*The Art of Agile Development* James Shore, Shane Warden, 2008 For those considering Extreme Programming, this book provides no-nonsense advice on agile planning, development, delivery, and management taken from the authors' many years of experience. While plenty of books address the what and why of agile development, very few offer the information users can apply directly.

*xUnit Test Patterns* Gerard Meszaros, 2007-05-21 Automated testing is a cornerstone of agile development. An effective testing strategy will deliver new functionality more aggressively, accelerate user feedback, and improve quality. However, for many developers, creating effective automated tests is a unique and unfamiliar challenge. *xUnit Test Patterns* is the definitive guide to writing automated tests using xUnit, the most popular unit testing framework in use today. Agile coach and test automation expert Gerard Meszaros describes 68 proven patterns for making tests easier to write, understand, and maintain. He then shows you how to make them more robust and repeatable--and far more cost-effective. Loaded with information, this book feels like three books in one. The first part is a detailed tutorial on test automation that covers everything from test strategy to in-depth test coding. The second part, a catalog of 18 frequently encountered test smells, provides trouble-shooting guidelines to help you determine the root cause of problems and the most applicable patterns. The third part contains detailed descriptions of each pattern, including refactoring instructions illustrated by extensive code samples in multiple programming languages.

*Refactoring in Java* Stefano Violetta, 2023-12-29 Master code refactoring techniques, improve code quality, design, and maintainability, and boost your development productivity with this comprehensive handbook Key Features Get a thorough understanding of code refinement for enhanced codebase efficiency Work with real-world examples and case studies for hands-on learning and application Focus on essential tools, emphasizing development productivity and robust coding habits Purchase of the print or Kindle book includes a free PDF eBook Book Description *Refactoring in Java* serves as an indispensable guide to enhancing your codebase's quality and maintainability. The book begins by helping you get to grips with refactoring fundamentals, including cultivating good coding habits and identifying red flags. You'll explore testing methodologies, essential refactoring techniques, and metaprogramming, as well as designing a good architecture. The chapters clearly explain how to refactor and improve your code using real-world examples and proven techniques. Part two equips you with the ability to recognize code smells, prioritize tasks, and employ automated refactoring tools, testing frameworks, and code analysis tools. You'll discover best practices to ensure efficient code improvement so that you can navigate complexities with ease. In part three, the book focuses on continuous learning, daily practices enhancing coding proficiency, and a holistic view of the architecture. You'll get practical tips to mitigate risks during refactoring, along with guidance on measuring impact to ensure that you become an efficient software craftsman. By the end of this book, you'll be able to avoid unproductive programming or architecting, detect red flags, and propose changes to improve the maintainability of your codebase. What you will learn Recognize and address common issues in your code Find out how to determine which improvements are most important Implement techniques such as using polymorphism instead of conditions Efficiently leverage tools for streamlining refactoring processes Enhance code reliability through effective testing practices Develop the skills needed for clean and readable code presentation Get to grips with the tools you need for thorough code examination Apply best practices for a more efficient coding workflow Who this book is for This book is for Java developers, software architects, and technical leads looking for a comprehensive guide to advancing their skills in software design and refactoring. The book is ideal for experienced Java enthusiasts, quality assurance engineers, and codebase maintainers as it provides practical insights, real-world examples, and essential patterns. Development managers who want to foster clean coding practices by using best practices for efficient workflows will also find this book useful.

*Software Design X-Rays* Adam Tornhill, 2018-03-08 Are you working on a codebase where cost overruns, death marches, and heroic fights with legacy code monsters are the norm? Battle these adversaries with novel ways to identify and prioritize technical debt, based on behavioral data from how developers work with code. And that's just for starters. Because good code involves social design, as well as technical design, you can find surprising dependencies between people and code to resolve coordination bottlenecks among teams. Best of all, the techniques build on behavioral data that you already have: your version-control system. Join the fight for better code! Use statistics and data science to uncover both problematic code and the behavioral patterns of the developers who build your software. This combination gives you insights you can't get from the code alone. Use these insights to prioritize refactoring needs, measure their effect, find implicit dependencies between different modules, and automatically create knowledge maps of your system based on actual code contributions. In a radical, much-needed change from common practice, guide organizational decisions with objective data by measuring how well your development teams align with the software architecture. Discover a comprehensive set of practical analysis techniques based on version-control data, where each point is illustrated with a case study from a real-world codebase. Because the techniques are language neutral, you can apply them to your own code no matter what programming language you use. Guide organizational decisions with objective data by measuring how well your development teams align with the software architecture. Apply research findings from social psychology to software development, ensuring you get the tools you need to coach your organization towards better code. If you're an experienced programmer, software architect, or technical manager, you'll get a new perspective that will change how you work with code. What You Need: You don't have to install anything to follow along in the book. The case studies in the book use well-known

open source projects hosted on GitHub. You'll use CodeScene, a free software analysis tool for open source projects, for the case studies. We also discuss alternative tooling options where they exist.

**Architectures for Adaptive Software Systems** Raffaella Mirandola, Ian Gorton, Christine Hofmeister, 2009-06-08 Much of a software architect's life is spent designing software systems to meet a set of quality requirements. General software quality attributes include scalability, security, performance or reliability. Quality attribute requirements are part of an application's non-functional requirements, which capture the many facets of how the functional requirements of an application are achieved. Understanding, modeling and continually evaluating quality attributes throughout a project lifecycle are all complex engineering tasks which continue to challenge the software engineering scientific community. While we search for improved approaches, methods, formalisms and tools that are usable in practice and can scale to large systems, the complexity of the applications that the software industry is challenged to build is ever increasing. Thus, as a research community, there is little opportunity for us to rest on our laurels, as our innovations that address new aspects of system complexity must be deployed and validated. To this end the 5th International Conference on the Quality of Software Architectures (QoSA) 2009 focused on architectures for adaptive software systems. Modern software systems must often reconfigure their structure and behavior to respond to continuous changes in requirements and in their execution environment. In these settings, quality models are helpful at an architectural level to guide systematic model-driven software development strategies by evaluating the impact of competing architectural choices.

*Smart and Sustainable Intelligent Systems* Namita Gupta, Prasenjit Chatterjee, Tanupriya Choudhury, 2021-04-13 The world is experiencing an unprecedented period of change and growth through all the electronic and technological developments and everyone on the planet has been impacted. What was once 'science fiction', today it is a reality. This book explores the world of many of once unthinkable advancements by explaining current technologies in great detail. Each chapter focuses on a different aspect - Machine Vision, Pattern Analysis and Image Processing - Advanced Trends in Computational Intelligence and Data Analytics - Futuristic Communication Technologies - Disruptive Technologies for Future Sustainability. The chapters include the list of topics that spans all the areas of smart intelligent systems and computing such as: Data Mining with Soft Computing, Evolutionary Computing, Quantum Computing, Expert Systems, Next Generation Communication, Blockchain and Trust Management, Intelligent Biometrics, Multi-Valued Logical Systems, Cloud Computing and security etc. An extensive list of bibliographic references at the end of each chapter guides the reader to probe further into application area of interest to him/her.

**JUnit Recipes** Scott Stirling, J.B. Rainsberger, 2004-06-30 When testing becomes a developer's habit good things tend to happen--good productivity, good code, and good job satisfaction. If you want some of that, there's no better way to start your testing habit, nor to continue feeding it, than with JUnit Recipes. In this book you will find one hundred and thirty-seven solutions to a range of problems, from simple to complex, selected for you by an experienced developer and master tester. Each recipe follows the same organization giving you the problem and its background before discussing your options in solving it. JUnit - the unit testing framework for Java - is simple to use, but some code can be tricky to test. When you're facing such code you will be glad to have this book. It is a how-to reference full of practical advice on all issues of testing, from how to name your test case classes to how to test complicated J2EE applications. Its valuable advice includes side matters that can have a big payoff, like how to organize your test data or how to manage expensive test resources. What's Inside: - Getting started with JUnit - Recipes for: servlets JSPs EJBs Database code much more - Difficult-to-test designs, and how to fix them - How testing saves time - Choose a JUnit extension: HTMLUnit XMLUnit ServletUnit EasyMock and more!

Your Code as a Crime Scene Adam Tornhill, 2015-03-30 Jack the Ripper and legacy codebases have more in common than you'd think. Inspired by forensic psychology methods, you'll learn strategies to predict the future of your codebase, assess refactoring direction, and understand how your team influences the design. With its unique blend of forensic psychology and code analysis, this book arms you with the strategies you need, no matter what programming language you use. Software is a living entity that's constantly changing. To understand software systems, we need to know where they came from and how they evolved. By mining commit data and analyzing the history of your code, you can start fixing ahead of time to eliminate broken designs, maintenance issues, and team productivity bottlenecks. In this book, you'll learn forensic psychology techniques to successfully maintain your software. You'll create a geographic profile from your commit data to find hotspots, and apply temporal coupling concepts to uncover hidden relationships between unrelated areas in your code. You'll also measure the effectiveness of your code improvements. You'll learn how to apply these techniques on projects both large and small. For small projects, you'll get new insights into your design and how well the code fits your ideas. For large projects, you'll identify the good and the fragile parts. Large-scale development is also a social activity, and the team's dynamics influence code quality. That's why this book shows you how to uncover social biases when analyzing the evolution of your system. You'll use commit messages as eyewitness accounts to what is really happening in your code. Finally, you'll put it all together by tracking organizational problems in the code and finding out how to fix them. Come join the hunt for better code! What You Need: You need Java 6 and Python 2.7 to run the accompanying analysis tools. You also need Git to follow along with the examples.

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### Refactoring For Software Design Smells Introduction

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