

# Program Development in Java

Abstraction,  
Specification, and  
Object-Oriented Design

Barbara Liskov  
with John Guttag

# Program Development In Java Abstraction Specification And Object Oriented Design

**Jörg Kienzle**



## **Program Development In Java Abstraction Specification And Object Oriented Design:**

**Program Development in Java** Barbara Liskov, John Guttag, 2000-06-06 Written by a world renowned expert on programming methodology and the winner of the 2008 Turing Award this book shows how to build production quality programs programs that are reliable easy to maintain and quick to modify Its emphasis is on modular program construction how to get the modules right and how to organize a program as a collection of modules The book presents a methodology effective for either an individual programmer who may be writing a small program or a single module in a larger one or a software engineer who may be part of a team developing a complex program comprised of many modules Both audiences will acquire a solid foundation for object oriented program design and component based software development from this methodology Because each module in a program corresponds to an abstraction such as a collection of documents or a routine to search the collection for documents of interest the book first explains the kinds of abstractions most useful to programmers procedures iteration abstractions and most critically data abstractions Indeed the author treats data abstraction as the central paradigm in object oriented program design and implementation The author also shows with numerous examples how to develop informal specifications that define these abstractions specifications that describe what the modules do and then discusses how to implement the modules so that they do what they are supposed to do with acceptable performance Other topics discussed include Encapsulation and the need for an implementation to provide the behavior defined by the specification Tradeoffs between simplicity and performance Techniques to help readers of code understand and reason about it focusing on such properties as rep invariants and abstraction functions Type hierarchy and its use in defining families of related data abstractions Debugging testing and requirements analysis Program design as a top down iterative process and design patterns The Java programming language is used for the book s examples However the techniques presented are language independent and an introduction to key Java concepts is included for programmers who may not be familiar with the language     [Program Development in Java](#) B. Liskov, John Guttag, 2001     [Program Development in Java](#) Barbara Liskov, John Guttag, 2001 Liskov engineering Massachusetts Institute of Technology and Guttag computer science and engineering also at MIT present a component based methodology for software program development The book focuses on modular program construction how to get the modules right and how to organize a program as a collection of modules It explains the key types of abstractions demonstrates how to develop specifications that define these abstractions and illustrates how to implement them using numerous examples An introduction to key Java concepts is included Annotation copyrighted by Book News Inc Portland OR     **Software Engineering Design** Carlos Otero, 2016-04-19 Taking a learn by doing approach Software Engineering Design Theory and Practice uses examples review questions chapter exercises and case study assignments to provide students and practitioners with the understanding required to design complex software systems Explaining the concepts that are immediately relevant to software designers it

be **Introduction to Programming Languages** Arvind Kumar Bansal,2013-12-14 In programming courses using the different syntax of multiple languages such as C Java PHP and Python for the same abstraction often confuses students new to computer science Introduction to Programming Languages separates programming language concepts from the restraints of multiple language syntax by discussing the concepts at an abstract level Designed for a one semester undergraduate course this classroom tested book teaches the principles of programming language design and implementation It presents Common features of programming languages at an abstract level rather than a comparative level The implementation model and behavior of programming paradigms at abstract levels so that students understand the power and limitations of programming paradigms Language constructs at a paradigm level A holistic view of programming language design and behavior To make the book self contained the author introduces the necessary concepts of data structures and discrete structures from the perspective of programming language theory The text covers classical topics such as syntax and semantics imperative programming program structures information exchange between subprograms object oriented programming logic programming and functional programming It also explores newer topics including dependency analysis communicating sequential processes concurrent programming constructs web and multimedia programming event based programming agent based programming synchronous languages high productivity programming on massive parallel computers models for mobile computing and much more Along with problems and further reading in each chapter the book includes in depth examples and case studies using various languages that help students understand syntax in practical contexts **Component-Oriented Programming** Andy Ju An Wang,Kai Qian,2005-04-29 Component Oriented

Programming offers a unique programming centered approach to component based software development that delivers the well developed training and practices you need to successfully apply this cost effective method Following an overview of basic theories and methodologies the authors provide a unified component infrastructure for building component software using JavaBeans EJB OSGi CORBA CCM NET and Web services You ll learn how to develop reusable software components build a software system of pre built software components design and implement a component based software system using various component based approaches Clear organization and self testing features make Component Oriented Programming an ideal textbook for graduate and undergraduate courses in computer science software engineering or information technology as well as a valuable reference for industry professionals Reliable Software Technologies -- Ada-Europe 2003 Jean-Pierre Rosen,Alfred Strohmeier,2003-06-02 The refereed proceedings of the 8th International Conference on Reliable Software Technologies Ada Europe 2003 held in Toulouse France in June 2003 The 29 revised full papers presented together with 3 invited papers were carefully reviewed and selected from numerous submissions The papers are organized in topical sections on Ravenscar language issues static analysis distributed information systems software metrics software components formal specification real time kernel software testing and real time systems design **Unraveling Software Maintenance**

**and Evolution** Ervin Varga, 2018-01-29 Software maintenance work is often considered a dauntingly rigid activity this book proves the opposite it demands high levels of creativity and thinking outside the box Highlighting the creative aspects of software maintenance and combining analytical and systems thinking in a holistic manner the book motivates readers not to blithely follow the beaten tracks of technical rationality It delivers the content in a pragmatic fashion using case studies which are woven into long running story lines The book is organized in four parts which can be read in any order except for the first chapter which introduces software maintenance and evolution and presents a number of case studies of software failures The Introduction to Key Concepts briefly introduces the major elements of software maintenance by highlighting various core concepts that are vital in order to see the forest for the trees Each such concept is illustrated with a worked example Next the Forward Engineering part debunks the myth that being fast and successful during initial development is all that matters To this end two categories of forward engineering are considered an inept initial project with a multitude of hard evolutionary phases and an effective initial project with multiple straightforward future increments Reengineering and Reverse Engineering shows the difficulties of dealing with a typical legacy system and tackles tasks such as retrofitting tests documenting a system restructuring a system to make it amenable for further improvements etc Lastly the DevOps section focuses on the importance and benefits of crossing the development versus operation chasm and demonstrates how the DevOps paradigm can turn a loosely coupled design into a loosely deployable solution The book is a valuable resource for readers familiar with the Java programming language and with a basic understanding and or experience of software construction and testing Packed with examples for every elaborated concept it offers complementary material for existing courses and is useful for students and professionals alike

**An Introduction to Software Design** Chenglie Hu, 2023-07-24 This textbook provides a balanced coverage on software design including design principles methodologies and techniques in contexts of designing modules of small and larger sizes with a multi paradigm viewpoint emphasizing design trade off Commonly used design diagrams and patterns are also covered in terms of the design ideas behind and their effective use The book also explores what software design thinking is the role it plays in a design process and ways to promote it Despite object orientation being still the center of attention there is a strong promotion throughout the book that software design should consider all appropriate design paradigms and methodologies The book is organized in 10 chapters Chapter 1 is dedicated to an exploration of what software design may be and entail Next chapters 2 and 3 are designed to help readers better understand object orientation and the essentials of object oriented design Chapter 4 is then dedicated to the design of methods while chapters 5 6 and 8 respectively include topics about the design of objects modeling with the Unified Modeling Language and the use of design patterns Larger software elements are often directly responsible for the formation of software architecture thus chapter 7 covers four kinds of larger software elements libraries components frameworks and microservices and their architectural implications Chapter 9 finally brings the presentation of software design to an end with

a coverage on software architecture focusing on software architectural views Case studies are important in learning how to design software hence chapter 10 then gathers some small design case studies that can be used in earlier chapters as appropriate These case studies can be extended in different ways to provide additional design opportunities This textbook book is intended for a junior level undergraduate course on software design yet the depth of the book makes it also appropriate for a design course at beginning graduate level Professionals may also find the book useful in their professional development     Model Checking Software Patrick Godefroid,2005-08-25 This volume contains the proceedings of the 12th International SPIN Workshop on Model Checking of Software held in San Francisco USA on August 22 24 2005

Mathematics of Program Construction Claude Bolduc,Jules Desharnais,Bechir Ktari,2010-06-26 This book constitutes the refereed proceedings of the 10th International Conference on Mathematics of Program Construction MPC 2010 held in Quebec City Canada in June 2010 The 19 revised full papers presented together with 1 invited talk and the abstracts of 2 invited talks were carefully reviewed and selected from 37 submissions The focus is on techniques that combine precision with conciseness enabling programs to be constructed by formal calculation Within this theme the scope of the series is very diverse including programming methodology program specification and transformation program analysis programming paradigms programming calculi programming language semantics security and program logics     **C# for Artists** Rick Miller,2008     **C# For Artists** Rick Miller,2015-01-01 Supercharge your creative energy by recognizing and utilizing the power of the flow Learn a development cycle you can actually use at work Comprehensive programming project walk through shows you how to apply the development cycle Project Approach Strategy helps you maintain programming project momentum C Student Survival Guide helps you tackle any project thrown at you Apply real world programming techniques to produce professional code In depth coverage of arrays eliminates their mystery Create complex GUIs using System Windows Forms components Learn the secrets of thread programming to create multithreaded applications Master the complexities of generic collections and learn how to create generic methods Discover three object oriented design principles that will greatly improve your software architectures Learn how to design with inheritance and composition to create flexible and reliable software Create well behaved objects that can be used predictably and reliably in C Net applications Learn how to use MSBuild to manage large programming projects Create multitiered database applications with the help of Microsoft s Enterprise Library Master the use of the singleton factory model view controller and command software design patterns Reinforce your learning with the help of chapter learning objectives skill building exercises suggested projects and self test questions Packed with numerous tables lots of pictures and tons of code examples over 7500 lines of code All code examples were compiled executed and tested before being used in the book to ensure quality And much much more     **Introduction to Software Testing** Paul Ammann,Jeff Offutt,2017 This classroom tested new edition features expanded coverage of the basics and test automation frameworks with new exercises and examples     **Specifying Software** R. D. Tennent,2002-02-25

Provides an innovative hands on introduction to techniques for specifying the behaviour of software components It is primarily intended for use as a text book for a course in the 2nd or 3rd year of Computer Science and Computer Engineering programs but it is also suitable for self study Using this book will help the reader improve programming skills and gain a sound foundation and motivation for subsequent courses in advanced algorithms and data structures software design formal methods compilers programming languages and theory The presentation is based on numerous examples and case studies appropriate to the level of programming expertise of the intended readership The main topics covered are techniques for using programmer friendly assertional notations to specify develop and verify small but non trivial algorithms and data representations and the use of state diagrams grammars and regular expressions to specify and develop recognizers for formal languages

*Tests and Proofs* Achim Brucker, Jacques Julliand, 2012-05-26 This book constitutes the refereed proceedings of the 6th International Conference on Test and Proofs TAP 2012 held in Prague Czech Republic in May June 2012 as part of the TOOLS 2012 Federated Conferences The 9 revised full papers presented together with 2 invited papers 4 short papers and one tutorial were carefully reviewed and selected from 29 submissions The papers are devoted to the convergence of tests and proofs for developing novel techniques and application that support engineers in building secure safe and reliable systems Among the topics covered are model based testing scenario based testing complex data structure generation and the validation of protocols and libraries

**Top 101 Women of STEM** Nicholas Faulkner, 2016-07-15 This extensive and insightful text introduces readers to an eclectic mix of women who have excelled in all areas of science technology engineering and math Some of the figures are less well known than others but all are highly accomplished and inspirational in their fields This book offers biographies of astronauts naturalists zoologists and astronomers among many others Any reader will be proud of the great pioneering work these women have done in their fields and be inspired to pursue such achievements on their own

*A Practical Guide to Data Structures and Algorithms using Java* Sally. A Goldman, Kenneth. J Goldman, 2007-08-23 Although traditional texts present isolated algorithms and data structures they do not provide a unifying structure and offer little guidance on how to appropriately select among them Furthermore these texts furnish little if any source code and leave many of the more difficult aspects of the implementation as exercises A fresh alternative to

Models in Software Engineering Jörg Kienzle, 2012-04-13 This book presents a comprehensive documentation of the scientific outcome of satellite events held at the 14th International Conference on Model Driven Engineering Languages and Systems MODELS 2011 held in Wellington New Zealand in October 2011 In addition to 3 contributions each of the doctoral symposium and the educators symposium papers from the following workshops are included variability for you multi paradigm modeling experiences and empirical studies in software modelling models run time model driven engineering verification and validation comparing modeling approaches models and evolution and model based architecting and construction of embedded systems

**Runtime Verification** Axel Legay, Saddek

Bensalem,2013-09-19 This book constitutes the refereed proceedings of the 4th International Conference on Runtime Verification RV 2013 held in Rennes France in September 2013 The 24 revised full papers presented together with 3 invited papers 2 tool papers and 6 tutorials were carefully reviewed and selected from 58 submissions The papers address a wide range of specification languages and formalisms for traces specification mining program instrumentation monitor construction techniques logging recording and replay fault detection localization recovery and repair program steering and adaptation as well as metrics and statistical information gathering combination of static and dynamic analyses and program execution visualization



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