

Object-oriented modeling and design

Chapter 1

Introduction

Object oriented means a collection of discrete objects that incorporate both data structure and behavior.

The characteristics required by an OO approach include 4 aspects:

Identity, classification, inheritance and polymorphism.

Identity means data is quantized into discrete, distinguishable entities called objects. Objects can be concrete such as a file in a file system. Each object has its own identity. Two objects are distinct even if all their attribute values are identical.

Classification means that objects with the same data structure and behavior are grouped into a class. Each object is said to be an instance of a class. An object has its own value for each attribute but shares the attribute names and operations with other instances of the class.

Inheritance is the sharing of attributes and operations among classes based on a hierarchical relationship. A super class has general information that subclasses refine and elaborate. Each subclass inherits all the features of its super class and adds its own unique features.

Polymorphism means that the same operation may behave differently for different classes. The move operation for example behaves differently for a pawn than for the queen in the chess game.

An operation is a procedure or transformation that an object performs or is subject to. An implementation of an operation by a specific class is called a method.

OO Development:

Development refers to the software life cycle: analysis, design and implementation. The essence of OO Development is the identification and organization of application concepts, rather than their final representation in a programming language.

Modeling Concepts: In the past, much of the programming languages focused on implementation rather than analysis and design.

OO development is a conceptual process independent of a programming language until final stages. OO development is fundamentally a way of thinking and not a programming technique.

Chapter 1 Introduction To Object Oriented Design

**Grady Booch, Douglas L. Bryan, Charles
G. Petersen**



Chapter 1 Introduction To Object Oriented Design:

Learning OOP Design Patterns Lyron Foster, 2023-03-05 This is an essential resource for software developers who want to understand and use object oriented design patterns effectively in their projects The book begins with an introduction to object oriented design patterns and their importance in software development It then provides an overview of the three main categories of design patterns creational structural and behavioral Each category is explored in detail including specific patterns such as the Singleton Factory Method Adapter and Observer patterns The book provides best practices for using these patterns in software development and real world examples of their usage The book also covers advanced design patterns such as the Flyweight Mediator and Visitor patterns as well as anti patterns and common pitfalls to avoid when using design patterns Finally the book explores how design patterns can be used in conjunction with popular frameworks and libraries providing examples of their usage in frameworks such as Laravel Spring and React By the end of the book readers will have a solid understanding of object oriented design patterns and how to use them effectively in their software development projects The book is written in a clear and concise manner making it accessible to developers of all skill levels

Object-Oriented Programming Understanding Classes and Objects Sunil Kumar Saini, 2023-04-27 Object Oriented Programming Understanding Classes and Objects is a book title that suggests it is a guide to learning about object oriented programming OOP concepts with a focus on classes and objects Object oriented programming is a programming paradigm that emphasizes the use of objects which are instances of classes that encapsulate data and behavior Classes define the structure and behavior of objects while objects are instances of classes that contain data and can perform actions or methods This book likely covers topics such as defining and using classes creating and manipulating objects encapsulation inheritance polymorphism and other OOP principles It may also cover design patterns and best practices for using OOP in software development Overall this book would be a helpful resource for those looking to deepen their understanding of OOP concepts specifically related to classes and objects

Practical Object-Oriented Design Sandi Metz, 2018-07-10 The Complete Guide to Writing Maintainable Manageable Pleasing and Powerful Object Oriented Applications Object oriented programming languages exist to help you create beautiful straightforward applications that are easy to change and simple to extend Unfortunately the world is awash with object oriented OO applications that are difficult to understand and expensive to change Practical Object Oriented Design Second Edition immerses you in an OO mindset and teaches you powerful real world object oriented design techniques with simple and practical examples Sandi Metz demonstrates how to build new applications that can survive success and repair existing applications that have become impossible to change Each technique is illustrated with extended examples in the easy to understand Ruby programming language all downloadable from the companion website poodr.com Fully updated for Ruby 2.5 this guide shows how to Decide what belongs in a single class Avoid entangling objects that should be kept separate Define flexible interfaces among objects Reduce programming

overhead costs with duck typing Successfully apply inheritance Build objects via composition Whatever your previous object oriented experience this concise guide will help you achieve the superior outcomes you re looking for Register your book for convenient access to downloads updates and or corrections as they become available See inside book for details *Practical Object-oriented Design in Ruby* Sandi Metz,2013 The Complete Guide to Writing More Maintainable Manageable Pleasing and Powerful Ruby Applications Ruby s widely admired ease of use has a downside Too many Ruby and Rails applications have been created without concern for their long term maintenance or evolution The Web is awash in Ruby code that is now virtually impossible to change or extend This text helps you solve that problem by using powerful real world object oriented design techniques which it thoroughly explains using simple and practical Ruby examples This book focuses squarely on object oriented Ruby application design Practical Object Oriented Design in Ruby will guide you to superior outcomes whatever your previous Ruby experience Novice Ruby programmers will find specific rules to live by intermediate Ruby programmers will find valuable principles they can flexibly interpret and apply and advanced Ruby programmers will find a common language they can use to lead development and guide their colleagues This guide will help you Understand how object oriented programming can help you craft Ruby code that is easier to maintain and upgrade Decide what belongs in a single Ruby class Avoid entangling objects that should be kept separate Define flexible interfaces among objects Reduce programming overhead costs with duck typing Successfully apply inheritance Build objects via composition Design cost effective tests Solve common problems associated with poorly designed Ruby code **Introduction to Programming and Object-Oriented Design Using Java** Jaime Niño,Frederick A. Hosch,2008-02-04 The 3rd edition of Introduction to Programming and Object Oriented Design continues to provide students with an objects first introduction to programming and software design using Java Java is used as a vehicle for teaching problem modeling using fundamental software engineering principles and concepts The text has been updated to include more problems and exercises and additional relevant examples It also offers optional interactive exercises using the DrJava integrated development environment IDE The UML is employed very informally for denoting objects object relationships and system dynamics No specific previous programming experience is assumed and the text is appropriate for first year computer science majors The text could also carry over to a second course on data structures or software OO design [An Introduction to Programming and Object-Oriented Design Using JAVA](#) Jaime Nino,Frederick A. Hosch,2002 Covers I O applets Java syntax design patterns and distinction between specification and implementation *Software Engineering with Ada* Grady Booch,Douglas L. Bryan,Charles G. Petersen,1994 Provides complete coverage of the Ada language and Ada programming in general by recognized authorities in Ada software engineering Demonstrates the power and performance of Ada in the management of large scale object oriented systems and shows how to use Ada features such as generics packages and tasking *Learning Python Design Patterns* Chetan Giridhar,2016-02-15 Leverage the power of Python design patterns to solve real world

problems in software architecture and design About This Book Understand the structural creational and behavioral Python design patterns Get to know the context and application of design patterns to solve real world problems in software architecture design and application development Get practical exposure through sample implementations in Python v3 5 for the design patterns featured Who This Book Is For This book is for Software architects and Python application developers who are passionate about software design It will be very useful to engineers with beginner level proficiency in Python and who love to work with Python 3 5 What You Will Learn Enhance your skills to create better software architecture Understand proven solutions to commonly occurring design issues Explore the design principles that form the basis of software design such as loose coupling the Hollywood principle and the Open Close principle among others Delve into the object oriented programming concepts and find out how they are used in software applications Develop an understanding of Creational Design Patterns and the different object creation methods that help you solve issues in software development Use Structural Design Patterns and find out how objects and classes interact to build larger applications Focus on the interaction between objects with the command and observer patterns Improve the productivity and code base of your application using Python design patterns In Detail With the increasing focus on optimized software architecture and design it is important that software architects think about optimizations in object creation code structure and interaction between objects at the architecture or design level This makes sure that the cost of software maintenance is low and code can be easily reused or is adaptable to change The key to this is reusability and low maintenance in design patterns Building on the success of the previous edition Learning Python Design Patterns Second Edition will help you implement real world scenarios with Python s latest release Python v3 5 We start by introducing design patterns from the Python perspective As you progress through the book you will learn about Singleton patterns Factory patterns and Facade patterns in detail After this we ll look at how to control object access with proxy patterns It also covers observer patterns command patterns and compound patterns By the end of the book you will have enhanced your professional abilities in software architecture design and development Style and approach This is an easy to follow guide to design patterns with hands on examples of real world scenarios and their implementation in Python v3 5 Each topic is explained and placed in context and for the more inquisitive there are more details on the concepts used

A Practical Introduction to Object-Oriented Design with C++ Steven P.

Reiss,1998-10-06 Learn the tools and techniques needed to design and implement moderate sized software systems Do you want to gain the necessary skills to effectively write moderate sized 10 000 to 50 000 line programs Would you like to develop a more advanced understanding of object oriented design and learn how to implement important design and style rules Do you want to be able to take a project from the concept stage to completion This is all possible with Steven Reiss s innovative text A Pracical Introduction to Software Design with C Reiss provides you with all the tools and techniques to enable you to design and implement moderate sized software systems alone or in a team The book details the proper use of

inheritance design notations using a simplified form of OMT to describe designs the use of object libraries such as STL creating library classes and the use of design patterns You ll also find useful discussions on advanced language and programming features such as exception handling interprocess communication and debugging tools and techniques

Python: Master the Art of Design Patterns Dusty Phillips, Chetan Giridhar, Sakis Kasampalis, 2016-09-30 Ensure your code is sleek efficient and elegant by mastering powerful Python design patterns About This Book Learn all about abstract design patterns and how to implement them in Python 3 Understand the structural creational and behavioral Python design patterns Get to know the context and application of design patterns to solve real world problems in software architecture design and application development Discover how to simplify Design Pattern implementation using the power of Python 3 Who This Book Is For If you have basic Python skills and wish to learn in depth how to correctly apply appropriate design patterns this course is tailor made for you What You Will Learn Discover what design patterns are and how to apply them to writing Python Implement objects in Python by creating classes and defining methods Separate related objects into a taxonomy of classes and describe the properties and behaviors of those objects via the class interface Understand when to use object oriented features and more importantly when not to use them Get to know proven solutions to common design issues Explore the design principles that form the basis of software design such as loose coupling the Hollywood principle and the Open Close principle among others Use Structural Design Patterns and find out how objects and classes interact to build larger applications Improve the productivity and code base of your application using Python design patterns Secure an interface using the Proxy pattern In Detail Python is an object oriented scripting language that is used in everything from data science to web development Known for its simplicity Python increases productivity and minimizes development time Through applying essential software engineering design patterns to Python Python code becomes even more efficient and reusable from project to project This learning path takes you through every traditional and advanced design pattern best applied to Python code building your skills in writing exceptional Python Divided into three distinct modules you ll go from foundational to advanced concepts by following a series of practical tutorials Start with the bedrock of Python programming the object oriented paradigm Rethink the way you work with Python as you work through the Python data structures and object oriented techniques essential to modern Python programming Build your confidence as you learn Python syntax and how to use OOP principles with Python tools such as Django and Kivy In the second module run through the most common and most useful design patterns from a Python perspective Progress through Singleton patterns Factory patterns Facade patterns and more all with detailed hands on guidance Enhance your professional abilities in in software architecture design and development In the final module run through the more complex and less common design patterns discovering how to apply them to Python coding with the help of real world examples Get to grips with the best practices of writing Python as well as creating systems architecture and troubleshooting issues This Learning Path combines some of the best that Packt

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An Introduction to Object-oriented Design in C++ Jo Ellen Perry, Harold D. Levin, 1996 Which comes first learning object oriented design or programming in C The authors present an object oriented approach at the outset as the best way to learn introductory programming concepts C doesn t have to be the top hierarchical level at the end of a programming journey The object oriented features of C are used as an appropriate foundation for learning to program

Journal of Object-oriented Programming , 1995

Object-oriented Design in C++ Using the Standard Template Library Nicholas J. DeLillo, 2002 The primary focus of Nick DeLilloAEs new book is on object oriented design OOD using the Standard Template Library STL The STL provides reusable reliable components for software design so students donAEt have to be concerned with the correctness and efficiency of the code they design The author assumes students have prior knowledge of data structures and algorithms then builds upon this knowledge by introducing the use of the STL Chapters 1 4 serve as a review of Data Structures and Algorithms including such topics as encapsulation inheritance polymorphism and traditional data structures In Chapter 5 the transition is made to using the STL to accomplish these same tasks enabling students to see the benefit of using these predefined tools The students also are introduced to OOD projects and how the STL is a powerful tool for this type of work While several texts may cover pieces of these topics this is the first text that covers them in one comprehensive book

Objects, Abstraction, Data Structures and Design Elliot B. Koffman, Paul A. T. Wolfgang, 2012-04-13 This book combines a strong emphasis on problem solving and software design with the study of data structures After providing the specification and implementation of an abstract data type the authors cover case studies that use the data structure to solve a significant problem In the implementation of each data structure and in the solutions of the case studies they reinforce the message Think then code by performing a thorough analysis of the problem and then carefully designing a solution Readers gain an understanding of why different data structures are needed the applications they are suited for and the advantages and disadvantages of their possible implementations

Object-oriented Programming in C++ Richard Johnsonbaugh, Martin Kalin, 1995 This introduction to object oriented programming in C demonstrates how to implement object oriented design in C It covers current features such as templates multiple inheritance C streams and exception handling Features include assertions and program correctness sample applications and end of chapter sections which discuss common programming errors

Object-oriented Design of Embedded Systems with Translation to VHDL Gretel Van Lente Coombs, 1998

Developing Assessment Models for Software Reliability at Late Design Phase Bhagyashri Deshpande, 2022-06-03 Doctoral Thesis Dissertation from the year 2021

in the subject Computer Science Software Savitribai Phule Pune University formerly University of Pune Department of Computer Science course Ph D language English abstract In this thesis report the pertinence of the models Neural Network model and Hellinger Net model for better software reliability prediction considering the parameters and software metrics affecting the software design in a real environment is described And a method of software defect detection and software reliability assessment using NN model and Intelligent Water Drop IWD Technique is presented Built on a Neural Network NN two models are developed which predicts the software reliability in a more accurate manner There are two kinds of hybrid models developed One uses IWD with NN and another is IWD with Spiking Neural Network SNN For both the modelling feature selection technique and learning algorithm is implemented and the data representation methods and some metrics associated with software reliability models are discussed Various datasets containing metrics values with software failures are applied to the proposed models These datasets are acquired from variety of software projects

Systems Analysis and Design Alan Dennis, Barbara Wixom, David Tegarden, 2020-11-26 Systems Analysis and Design An Object Oriented Approach with UML Sixth Edition helps students develop the core skills required to plan design analyze and implement information systems Offering a practical hands on approach to the subject this textbook is designed to keep students focused on doing SAD rather than simply reading about it Each chapter describes a specific part of the SAD process providing clear instructions a detailed example and practice exercises Students are guided through the topics in the same order as professional analysts working on a typical real world project Now in its sixth edition this edition has been carefully updated to reflect current methods and practices in SAD and prepare students for their future roles as systems analysts Every essential area of systems analysis and design is clearly and thoroughly covered from project management to analysis and design modeling to construction installation and operations The textbook includes access to a range of teaching and learning resources and a running case study of a fictitious healthcare company that shows students how SAD concepts are applied in real life scenarios

Introduction to JAVA Programming Y. Daniel Liang, 2007 Programming is above all problem solving This book will help students thoroughly understand real world programming problems and solve those problems quickly and efficiently using Java s sophisticated design and coding facilities

A System to Support Object-oriented Design Evolution Jane Ching-Ying Wang, 1997 Abstract In large scale software development design occurs in an evolutionary manner This is particularly true in object oriented development During the design evolution process many changes will be performed to different sets of objects Manually performing these changes and maintaining propagation of changes is a tedious and often quite complicated task In this thesis we present a framework for supporting design evolution We describe a uniform way to define the semantics of object change operators present a set of change operators that can be used to manage and control design evolution of an object oriented system and describe a uniform mechanism to define change operators

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