

[Books] Elements Of Computing Systems Building A Modern Computer From First Principles The Elements Of Computing Systems

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The Elements of Computing Systems-Noam Nisan 2008 This title gives students an integrated and rigorous picture of applied computer science, as it comes to play in the construction of a simple yet powerful computer system.

The Elements of Computing Systems-Noam Nisan 2008-01-25 A textbook with a hands-on approach that leads students through the gradual construction of a complete and working computer system including the hardware platform and the software hierarchy. In the early days of computer science, the interactions of hardware, software, compilers, and operating system were simple enough to allow students to see an overall picture of how computers worked. With the increasing complexity of computer technology and the resulting specialization of knowledge, such clarity is often lost. Unlike other texts that cover only one aspect of the field, The Elements of Computing Systems gives students an integrated and rigorous picture of applied computer science, as its comes to play in the construction of a simple yet powerful computer system. Indeed, the best way to understand how computers work is to build one from scratch, and this textbook leads students through twelve chapters and projects that gradually build a basic hardware platform and a modern software hierarchy from the ground up. In the process, the students gain hands-on knowledge of hardware architecture, operating systems, programming languages, compilers, data structures, algorithms, and software engineering. Using this constructive approach, the book exposes a significant body of computer science knowledge and demonstrates how theoretical and applied techniques taught in other courses fit into the overall picture. Designed to support one- or two-semester courses, the book is based on an abstraction-implementation paradigm; each chapter presents a key hardware or software abstraction, a proposed implementation that makes it concrete, and an actual project. The emerging computer system can be built by following the chapters, although this is only one option, since the projects are self-contained and can be done or skipped in any order. All the computer science knowledge necessary for completing the projects is embedded in the book, the only pre-requisite being a programming experience. The book's web site provides all tools and materials necessary to build all the hardware and software systems described in the text, including two hundred test programs for the twelve projects. The projects and systems can be modified to meet various teaching needs, and all the supplied software is open-source.

The Elements of Computing Systems-Noam Nisan 2005 In the early days of computer science, the interactions of hardware, software, compilers, and operating system were simple enough to allow students to see an overall picture of how computers worked. With the increasing complexity of computer technology and the resulting specialization of knowledge, such clarity is often lost. Unlike other texts that cover only one aspect of the field, The Elements of Computing Systems gives students an integrated and rigorous picture of applied computer science, as its comes to play in the construction of a simple yet powerful computer system. Indeed, the best way to understand how computers work is to build one from scratch, and this textbook leads students through twelve chapters and projects that gradually build a basic hardware platform and a modern software hierarchy from the ground up. In the process, the students gain hands-on knowledge of hardware architecture, operating systems, programming languages, compilers, data structures, algorithms, and software engineering. Using this

constructive approach, the book exposes a significant body of computer science knowledge and demonstrates how theoretical and applied techniques taught in other courses fit into the overall picture. Designed to support one- or two-semester courses, the book is based on an abstraction-implementation paradigm; each chapter presents a key hardware or software abstraction, a proposed implementation that makes it concrete, and an actual project. The emerging computer system can be built by following the chapters, although this is only one option, since the projects are self-contained and can be done or skipped in any order. All the computer science knowledge necessary for completing the projects is embedded in the book, the only pre-requisite being a programming experience. The book's web site provides all tools and materials necessary to build all the hardware and software systems described in the text, including two hundred test programs for the twelve projects. The projects and systems can be modified to meet various teaching needs, and all the supplied software is open-source.

The Elements of Computing Systems, Second Edition-Noam Nisan 2021-06-15 "A unique approach to teaching about hardware and software by having students build their own machine from scratch, using simple simulators provided on the companion site"--

Principles of Computer System Design-Jerome H. Saltzer 2009-05-21 Principles of Computer System Design is the first textbook to take a principles-based approach to the computer system design. It identifies, examines, and illustrates fundamental concepts in computer system design that are common across operating systems, networks, database systems, distributed systems, programming languages, software engineering, security, fault tolerance, and architecture. Through carefully analyzed case studies from each of these disciplines, it demonstrates how to apply these concepts to tackle practical system design problems. To support the focus on design, the text identifies and explains abstractions that have proven successful in practice such as remote procedure call, client/service organization, file systems, data integrity, consistency, and authenticated messages. Most computer systems are built using a handful of such abstractions. The text describes how these abstractions are implemented, demonstrates how they are used in different systems, and prepares the reader to apply them in future designs. The book is recommended for junior and senior undergraduate students in Operating Systems, Distributed Systems, Distributed Operating Systems and/or Computer Systems Design courses; and professional computer systems designers. Features: Concepts of computer system design guided by fundamental principles. Cross-cutting approach that identifies abstractions common to networking, operating systems, transaction systems, distributed systems, architecture, and software engineering. Case studies that make the abstractions real: naming (DNS and the URL); file systems (the UNIX file system); clients and services (NFS); virtualization (virtual machines); scheduling (disk arms); security (TLS). Numerous pseudocode fragments that provide concrete examples of abstract concepts. Extensive support. The authors and MIT OpenCourseWare provide on-line, free of charge, open educational resources, including additional chapters, course syllabi, board layouts and slides, lecture videos, and an archive of lecture schedules, class assignments, and design projects.

Bebop to the Boolean Boogie-Clive Maxfield 2008-12-05 This entertaining and readable book provides a solid, comprehensive introduction to contemporary electronics. It's not a "how-to-do" electronics book, but rather an in-depth explanation of how today's integrated circuits work, how they are designed and manufactured, and how

they are put together into powerful and sophisticated electronic systems. In addition to the technical details, it's packed with practical information of interest and use to engineers and support personnel in the electronics industry. It even tells how to pronounce the alphabet soup of acronyms that runs rampant in the industry. Written in conversational, fun style that has generated a strong following for the author and sales of over 14,000 copies for the first two editions The Third Edition is even bigger and better, with lots of new material, illustrations, and an expanded glossary Ideal for training incoming engineers and technicians, and for people in marketing or other related fields or anyone else who needs to familiarize themselves with electronics terms and technology

Designing Embedded Hardware-John Catsoulis 2002 Intelligent readers who want to build their own embedded computer systems-- installed in everything from cell phones to cars to handheld organizers to refrigerators-- will find this book to be the most in-depth, practical, and up-to-date guide on the market. Designing Embedded Hardware carefully steers between the practical and philosophical aspects, so developers can both create their own devices and gadgets and customize and extend off-the-shelf systems. There are hundreds of books to choose from if you need to learn programming, but only a few are available if you want to learn to create hardware. Designing Embedded Hardware provides software and hardware engineers with no prior experience in embedded systems with the necessary conceptual and design building blocks to understand the architectures of embedded systems. Written to provide the depth of coverage and real-world examples developers need, Designing Embedded Hardware also provides a road-map to the pitfalls and traps to avoid in designing embedded systems. Designing Embedded Hardware covers such essential topics as: The principles of developing computer hardware Core hardware designs Assembly language concepts Parallel I/O Analog-digital conversion Timers (internal and external) UART Serial Peripheral Interface Inter-Integrated Circuit Bus Controller Area Network (CAN) Data Converter Interface (DCI) Low-power operation This invaluable and eminently useful book gives you the practical tools and skills to develop, build, and program your own application-specific computers.

Building a Secure Computer System-Morrie Gasser 1988 Little prior knowledge is needed to use this long-needed reference. Computer professionals and software engineers will learn how to design secure operating systems, networks and applications.

But how Do it Know?-J. Clark Scott 2009-07-04 This book thoroughly explains how computers work. It starts by fully examining a NAND gate, then goes on to build every piece and part of a small, fully operational computer. The necessity and use of codes is presented in parallel with the appropriate pieces of hardware. The book can be easily understood by anyone whether they have a technical background or not. It could be used as a textbook.

Computer Systems-Randal E.. Bryant 2013-07-23 For Computer Systems, Computer Organization and Architecture courses in CS, EE, and ECE departments. Few students studying computer science or computer engineering will ever have the opportunity to build a computer system. On the other hand, most students will be required to use and program computers on a near daily basis. Computer Systems: A Programmer's Perspective introduces the important and enduring concepts that underlie computer systems by showing how these ideas affect the correctness, performance, and utility of application programs. The text's hands-on approach (including a comprehensive set of labs) helps students understand the under-the-hood operation of a modern computer system and prepares them for future courses in systems topics such as compilers, computer architecture, operating systems, and networking.

The Elements of Computing Systems-Noam Nisan 2004

Computer Time Travel-Js Walker 2017-01-31 Step by step instructions to build a microprocessor from transistors

Computer Systems-Ata Elahi 2017-11-08 This textbook covers digital design, fundamentals of computer

architecture, and assembly language. The book starts by introducing basic number systems, character coding, basic knowledge in digital design, and components of a computer. The book goes on to discuss information representation in computing; Boolean algebra and logic gates; sequential logic; input/output; and CPU performance. The author also covers ARM architecture, ARM instructions and ARM assembly language which is used in a variety of devices such as cell phones, digital TV, automobiles, routers, and switches. The book contains a set of laboratory experiments related to digital design using Logisim software; in addition, each chapter features objectives, summaries, key terms, review questions and problems. The book is targeted to students majoring Computer Science, Information System and IT and follows the ACM/IEEE 2013 guidelines. • Comprehensive textbook covering digital design, computer architecture, and ARM architecture and assembly • Covers basic number system and coding, basic knowledge in digital design, and components of a computer • Features laboratory exercises in addition to objectives, summaries, key terms, review questions, and problems in each chapter

The Social Design of Technical Systems-Brian Whitworth 2014-05-01 Hundreds of millions of people use social technologies like Wikipedia, Facebook and YouTube every day, but what makes them work? And what is the next step? The Social Design of Technical Systems explores the path from computing revolution to social evolution. Based on the assumption that it is essential to consider social as well as technological requirements, as we move to create the systems of the future, this book explores the ways in which technology fits, or fails to fit, into the social reality of the modern world. Important performance criteria for social systems, such as fairness, synergy, transparency, order and freedom, are clearly explained for the first time from within a comprehensive systems framework, making this book invaluable for anyone interested in socio-technical systems, especially those planning to build social software. This book reveals the social dilemmas that destroy communities, exposes the myth that computers are smart, analyses social errors like the credit meltdown, proposes online rights standards and suggests community-based business models. If you believe that our future depends on merging social virtue and technology power, you should read this book.

Self-Aware Computing Systems-Samuel Kounev 2017-01-23 This book provides formal and informal definitions and taxonomies for self-aware computing systems, and explains how self-aware computing relates to many existing subfields of computer science, especially software engineering. It describes architectures and algorithms for self-aware systems as well as the benefits and pitfalls of self-awareness, and reviews much of the latest relevant research across a wide array of disciplines, including open research challenges. The chapters of this book are organized into five parts: Introduction, System Architectures, Methods and Algorithms, Applications and Case Studies, and Outlook. Part I offers an introduction that defines self-aware computing systems from multiple perspectives, and establishes a formal definition, a taxonomy and a set of reference scenarios that help to unify the remaining chapters. Next, Part II explores architectures for self-aware computing systems, such as generic concepts and notations that allow a wide range of self-aware system architectures to be described and compared with both isolated and interacting systems. It also reviews the current state of reference architectures, architectural frameworks, and languages for self-aware systems. Part III focuses on methods and algorithms for self-aware computing systems by addressing issues pertaining to system design, like modeling, synthesis and verification. It also examines topics such as adaptation, benchmarks and metrics. Part IV then presents applications and case studies in various domains including cloud computing, data centers, cyber-physical systems, and the degree to which self-aware computing approaches have been adopted within those domains. Lastly, Part V surveys open challenges and future research directions for self-aware computing systems. It can be used as a handbook for professionals and researchers working in areas related to self-aware computing, and can also serve as an advanced textbook for lecturers and postgraduate students studying subjects like advanced software engineering, autonomic computing, self-adaptive systems, and data-center resource management. Each chapter is largely self-contained, and offers plenty of references for anyone wishing to pursue the topic more deeply.

Computers at Risk-National Research Council 1990-02-01 Computers at Risk presents a comprehensive agenda for developing nationwide policies and practices for computer security. Specific recommendations are provided for industry and for government agencies engaged in computer security activities. The volume also outlines problems and opportunities in computer security research, recommends ways to improve the research infrastructure, and suggests topics for investigators. The book explores the diversity of the field, the need to

engineer countermeasures based on speculation of what experts think computer attackers may do next, why the technology community has failed to respond to the need for enhanced security systems, how innovators could be encouraged to bring more options to the marketplace, and balancing the importance of security against the right of privacy.

Build Your Own Computer-Richard Whipple 2019-06-03 In this book, I begin with first principles (AND, OR, and NOT logic) and carry out a basic computer design finishing with a working computer using a Field Programmable Gate Array. A knowledge of computer science or electronics is not needed to follow along. Each step will rely on supplied information and simple reasoning. Whether novice or computer professional, knowing how a computer works allows you to take full advantage of its capabilities.

Structure and Interpretation of Computer Programs-Harold Abelson 1996 NOT AVAILABLE IN THE US AND CANADA. Customers in the US and Canada must order the Cloth edition of this title.

The Future of Computing Performance-National Research Council 2011-04-21 The end of dramatic exponential growth in single-processor performance marks the end of the dominance of the single microprocessor in computing. The era of sequential computing must give way to a new era in which parallelism is at the forefront. Although important scientific and engineering challenges lie ahead, this is an opportune time for innovation in programming systems and computing architectures. We have already begun to see diversity in computer designs to optimize for such considerations as power and throughput. The next generation of discoveries is likely to require advances at both the hardware and software levels of computing systems. There is no guarantee that we can make parallel computing as common and easy to use as yesterday's sequential single-processor computer systems, but unless we aggressively pursue efforts suggested by the recommendations in this book, it will be "game over" for growth in computing performance. If parallel programming and related software efforts fail to become widespread, the development of exciting new applications that drive the computer industry will stall; if such innovation stalls, many other parts of the economy will follow suit. The Future of Computing Performance describes the factors that have led to the future limitations on growth for single processors that are based on complementary metal oxide semiconductor (CMOS) technology. It explores challenges inherent in parallel computing and architecture, including ever-increasing power consumption and the escalated requirements for heat dissipation. The book delineates a research, practice, and education agenda to help overcome these challenges. The Future of Computing Performance will guide researchers, manufacturers, and information technology professionals in the right direction for sustainable growth in computer performance, so that we may all enjoy the next level of benefits to society.

BeagleBone By Example-Jayakarthiseyan Prabakar 2016-08-31 Learn how to build physical computing systems using BeagleBone Black and Python About This Book Get to grips with the fundamentals of BeagleBone Leverage Python scripts to program BeagleBone for your requirements Build four exciting projects, from home automation to a tele-controlled robot Who This Book Is For This book is intended for hobbyists and consumers who wish to create impressive projects using BeagleBone. You must be familiar with Python programming. What You Will Learn Program on BeagleBone Black using Python Interface sensors and actuators to BeagleBone Black Build your own real-time physical computing systems Connect physical computing systems to cloud servers Build your own home automation and home security system Build your own tele-controlled robot with real-time video streaming In Detail BeagleBone is a low cost, community-supported development platform to develop a variety of electronic projects. This book will introduce you to BeagleBone and get you building fun, cool, and innovative projects with it. Start with the specifications of BeagleBone Black and its operating systems, then get to grips with the GPIOs available in BeagleBone Black. Work through four types of exciting projects: building real-time physical computing systems, home automation, image processing for a security system, and building your own tele-controlled robot and learn the fundamentals of a variety of projects in a single book. By the end of this book, you will be able to write code for BeagleBone in order to operate hardware and impart decision-making capabilities with the help of efficient coding in Python. Style and approach This book is a step by step guide that will walk you through the fundamentals of building different projects using BeagleBone Black.

Computer Hardware, System Software, and Architecture-Thom Luce 1989

Python for Data Analysis-Wes McKinney 2017-09-25 Get complete instructions for manipulating, processing, cleaning, and crunching datasets in Python. Updated for Python 3.6, the second edition of this hands-on guide is packed with practical case studies that show you how to solve a broad set of data analysis problems effectively. You'll learn the latest versions of pandas, NumPy, IPython, and Jupyter in the process. Written by Wes McKinney, the creator of the Python pandas project, this book is a practical, modern introduction to data science tools in Python. It's ideal for analysts new to Python and for Python programmers new to data science and scientific computing. Data files and related material are available on GitHub. Use the IPython shell and Jupyter notebook for exploratory computing Learn basic and advanced features in NumPy (Numerical Python) Get started with data analysis tools in the pandas library Use flexible tools to load, clean, transform, merge, and reshape data Create informative visualizations with matplotlib Apply the pandas groupby facility to slice, dice, and summarize datasets Analyze and manipulate regular and irregular time series data Learn how to solve real-world data analysis problems with thorough, detailed examples

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Programming Embedded Systems-Michael Barr 2006 Authored by two of the leading authorities in the field, this guide offers readers the knowledge and skills needed to achieve proficiency with embedded software.

Elements Of Computing Systems The: Building A Modern Computer From First Principles-Nisan & Schocken 2004

Understanding Computers, Smartphones and the Internet-Ernie Dainow Most introductory books about computers are long, detailed technical books such as those used in a computer science course or else tutorials that provide instructions on how to operate a computer with little description of what happens inside the machine. This book fits in the large gap between these two extremes. It is for people who would like to understand how computers work, without having to learn a lot of technical details. Only the most important things about computers are covered. There is no math except some simple arithmetic. The only prerequisite is knowing how to use a web browser. As an alternative or adjunct to reading the book, you can watch a series of short videos by going to youtube.com and searching for "Understanding Computers, Smartphones and the Internet". Only current day technology is covered. People who are interested in learning about how computers evolved from the earliest machines can read the companion book "A Concise History of Computers, Smartphones and the Internet". While originally intended for people who are not in the computer field, this book is also useful for those taking a coding course or an introductory computer science course. Even people already in the computer field will find things of interest in this book.

Elements of Distributed Computing-Vijay K. Garg 2002-05-23 A lucid and up-to-date introduction to the fundamentals of distributed computing systems As distributed systems become increasingly available, the need for a fundamental discussion of the subject has grown. Designed for first-year graduate students and advanced undergraduates as well as practicing computer engineers seeking a solid grounding in the subject, this well-organized text covers the fundamental concepts in distributed computing systems such as time, state, simultaneity, order, knowledge, failure, and agreement in distributed systems. Departing from the focus on shared memory and synchronous systems commonly taken by other texts, this is the first useful reference based on an asynchronous model of distributed computing, the most widely used in academia and industry. The emphasis of the book is on developing general mechanisms that can be applied to a variety of problems. Its examples-clocks, locks, cameras, sensors, controllers, slicers, and synchronizers-have been carefully chosen so that they are fundamental and yet useful in practical contexts. The text's advantages include: Emphasizes general mechanisms that can be applied to a variety of problems Uses a simple induction-based technique to prove correctness of all

algorithms Includes a variety of exercises at the end of each chapter Contains material that has been extensively class tested Gives instructor flexibility in choosing appropriate balance between practice and theory of distributed computing

Computer Organization and Design Fundamentals-David L. Tarnoff 2007 Computer Organization and Design Fundamentals takes the reader from the basic design principles of the modern digital computer to a top-level examination of its architecture. This book can serve either as a textbook to an introductory course on computer hardware or as the basic text for the aspiring geek who wants to learn about digital design. The material is presented in four parts. The first part describes how computers represent and manipulate numbers. The second part presents the tools used at all levels of binary design. The third part introduces the reader to computer system theory with topics such as memory, caches, hard drives, pipelining, and interrupts. The last part applies these theories through an introduction to the Intel 80x86 architecture and assembly language. The material is presented using practical terms and examples with an aim toward providing anyone who works with computer systems the ability to use them more effectively through a better understanding of their design.

Algebraic Topology-Allen Hatcher 2002 An introductory textbook suitable for use in a course or for self-study, featuring broad coverage of the subject and a readable exposition, with many examples and exercises.

Catalyzing Inquiry at the Interface of Computing and Biology-National Research Council 2006-01-01 Advances in computer science and technology and in biology over the last several years have opened up the possibility for computing to help answer fundamental questions in biology and for biology to help with new approaches to computing. Making the most of the research opportunities at the interface of computing and biology requires the active participation of people from both fields. While past attempts have been made in this direction, circumstances today appear to be much more favorable for progress. To help take advantage of these opportunities, this study was requested of the NRC by the National Science Foundation, the Department of Defense, the National Institutes of Health, and the Department of Energy. The report provides the basis for establishing cross-disciplinary collaboration between biology and computing including an analysis of potential impediments and strategies for overcoming them. The report also presents a wealth of examples that should encourage students in the biological sciences to look for ways to enable them to be more effective users of computing in their studies.

Computer Architecture-John L. Hennessy 2012 The computing world today is in the middle of a revolution: mobile clients and cloud computing have emerged as the dominant paradigms driving programming and hardware innovation today. The Fifth Edition of Computer Architecture focuses on this dramatic shift, exploring the ways in which software and technology in the cloud are accessed by cell phones, tablets, laptops, and other mobile computing devices. Each chapter includes two real-world examples, one mobile and one datacenter, to illustrate this revolutionary change. Updated to cover the mobile computing revolution Emphasizes the two most important topics in architecture today: memory hierarchy and parallelism in all its forms. Develops common themes throughout each chapter: power, performance, cost, dependability, protection, programming models, and emerging trends ("What's Next") Includes three review appendices in the printed text. Additional reference appendices are available online. Includes updated Case Studies and completely new exercises.

Computer Desktop Encyclopedia-Alan Freedman 2001

Building Secure and Reliable Systems-Heather Adkins 2020-03-16 Can a system be considered truly reliable if it isn't fundamentally secure? Or can it be considered secure if it's unreliable? Security is crucial to the design and operation of scalable systems in production, as it plays an important part in product quality, performance, and availability. In this book, experts from Google share best practices to help your organization design scalable and reliable systems that are fundamentally secure. Two previous O'Reilly books from Google—Site Reliability Engineering and The Site Reliability Workbook—demonstrated how and why a commitment to the entire service

lifecycle enables organizations to successfully build, deploy, monitor, and maintain software systems. In this latest guide, the authors offer insights into system design, implementation, and maintenance from practitioners who specialize in security and reliability. They also discuss how building and adopting their recommended best practices requires a culture that's supportive of such change. You'll learn about secure and reliable systems through: Design strategies Recommendations for coding, testing, and debugging practices Strategies to prepare for, respond to, and recover from incidents Cultural best practices that help teams across your organization collaborate effectively

Organic Computing - Technical Systems for Survival in the Real World-Christian Müller-Schloer 2017-12-28 This book is a comprehensive introduction into Organic Computing (OC), presenting systematically the current state-of-the-art in OC. It starts with motivating examples of self-organising, self-adaptive and emergent systems, derives their common characteristics and explains the fundamental ideas for a formal characterisation of such systems. Special emphasis is given to a quantitative treatment of concepts like self-organisation, emergence, autonomy, robustness, and adaptivity. The book shows practical examples of architectures for OC systems and their applications in traffic control, grid computing, sensor networks, robotics, and smart camera systems. The extension of single OC systems into collective systems consisting of social agents based on concepts like trust and reputation is explained. OC makes heavy use of learning and optimisation technologies; a compact overview of these technologies and related approaches to self-organising systems is provided. So far, OC literature has been published with the researcher in mind. Although the existing books have tried to follow a didactical concept, they remain basically collections of scientific papers. A comprehensive and systematic account of the OC ideas, methods, and achievements in the form of a textbook which lends itself to the newcomer in this field has been missing so far. The targeted reader of this book is the master student in Computer Science, Computer Engineering or Electrical Engineering - or any other newcomer to the field of Organic Computing with some technical or Computer Science background. Readers can seek access to OC ideas from different perspectives: OC can be viewed (1) as a „philosophy“ of adaptive and self-organising - life-like - technical systems, (2) as an approach to a more quantitative and formal understanding of such systems, and finally (3) a construction method for the practitioner who wants to build such systems. In this book, we first try to convey to the reader a feeling of the special character of natural and technical self-organising and adaptive systems through a large number of illustrative examples. Then we discuss quantitative aspects of such forms of organisation, and finally we turn to methods of how to build such systems for practical applications.

Introduction To Computing Systems-Patt 2004-05-01

Ideas That Created the Future-Harry R. Lewis 2021 "An anthology of classic papers in computer science with introductions by the editor"--

Information Systems for Business and Beyond-David T. Bourgeois 2014 "Information Systems for Business and Beyond introduces the concept of information systems, their use in business, and the larger impact they are having on our world."--BC Campus website.

Design Patterns: Elements of Reusable Object-Oriented Software-Erich Gamma 1995 Capturing a wealth of experience about the design of object-oriented software, four top-notch designers present a catalog of simple and succinct solutions to commonly occurring design problems. Previously undocumented, these 23 patterns allow designers to create more flexible, elegant, and ultimately reusable designs without having to rediscover the design solutions themselves.

The Grammar of Graphics-Leland Wilkinson 2013-03-09 Written for statisticians, computer scientists, geographers, research and applied scientists, and others interested in visualizing data, this book presents a unique foundation for producing almost every quantitative graphic found in scientific journals, newspapers, statistical packages, and data visualization systems. It was designed for a distributed computing environment,

with special attention given to conserving computer code and system resources. While the tangible result of this work is a Java production graphics library, the text focuses on the deep structures involved in producing quantitative graphics from data. It investigates the rules that underlie pie charts, bar charts, scatterplots, function plots, maps, mosaics, and radar charts. These rules are abstracted from the work of Bertin, Cleveland, Kosslyn, MacEachren, Pinker, Tufte, Tukey, Tobler, and other theorists of quantitative graphics.

Code the Classics Volume 1-David Crookes 2019-12-13