Modern Compiler Implement In ML

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Modern Compiler Implementation in ML -
Andrew W. Appel 1998
This textbook describes all phases of a modern compiler: lexical analysis, parsing, abstract syntax, semantic actions, intermediate representations, instruction selection via tree matching, dataflow analysis, graph-coloring register allocation, and runtime systems. It

includes good coverage of current techniques in code generation and register allocation, as well as functional and object-oriented languages, that is missing from most books. The most accepted and successful techniques are described in a concise way, rather than as an exhaustive catalog of every possible variant. Detailed descriptions of the interfaces between modules of a compiler are illustrated with actual ML signatures. The first part of the book, Fundamentals of Compilation, is suitable for a one-semester first course in compiler design. The second part, Advanced Topics, which include SSA form, loop scheduling, pipelining, and optimization for cache-memory hierarchies, can be used as the basis for a second semester or graduate course. A unique feature of the book is a well designed compiler implementation project in ML, including front-end and "high-tech" back-end phases, so that students can build a complete working compiler in one semester. Accompanying support software is available.

Retargetable Compiler Technology for Embedded Systems - Rainer Leupers 2013-03-09

It is well known that embedded systems have to be implemented efficiently. This requires that processors optimized for certain application domains are used in embedded systems. Such an optimization requires a careful exploration of the design space, including a detailed study of cost/performance tradeoffs. In order to avoid time-consuming assembly language programming during design space exploration, compilers are needed. In order to analyze the effect of various software or hardware configurations on the performance, retargetable compilers are needed that can generate code for numerous different potential hardware configurations. This book provides a comprehensive and up-to-date overview of the fast developing area of retargetable compilers for embedded systems. It describes a large set

important tools as well as applications of retargetable compilers at different levels in the design flow. Retargetable Compiler Technology for Embedded Systems is mostly self-contained and requires only fundamental knowledge in software and compiler design. It is intended to be a key reference for researchers and designers working on software, compilers, and processor optimization for embedded systems.

Engineering a Compiler - Keith Cooper 2011-01-18
This entirely revised second edition of Engineering a Compiler is full of technical updates and new material covering the latest developments in compiler technology. In this comprehensive text you will learn important techniques for constructing a modern compiler. Leading educators and researchers Keith Cooper and Linda Torczon combine basic principles with pragmatic insights from their experience building state-of-the-art compilers. They will help you fully understand important techniques such as compilation of imperative and object-oriented languages, construction of static single assignment forms, instruction scheduling, and graph-coloring register allocation. In-depth treatment of algorithms and techniques used in the front end of a modern compiler Focus on code optimization and code generation, the primary areas of recent research and development Improvements in presentation including conceptual overviews for each chapter, summaries and review questions for sections, and prominent placement of definitions for new terms Examples drawn from several different programming languages

Program Logics for Certified Compilers - Andrew W. Appel 2014-04-21
This tutorial for graduate students covers practical and theoretical aspects of separation logic with constructions and proofs in Coq.

Compiler Construction - Niklaus Wirth 1996
A refreshing antidote to heavy theoretical tomes, this book is a concise, practical guide to modern

compiler design and construction by an acknowledged master. Readers are taken step-by-step through each stage of compiler design, using the simple yet powerful method of recursive descent to create a compiler for Oberon-0, a subset of the author's Oberon language. A disk provided with the book gives full listings of the Oberon-0 compiler and associated tools. The hands-on, pragmatic approach makes the book equally attractive for project-oriented courses in compiler design and for software engineers wishing to develop their skills in system software.

Applications of Machine Learning - Prashant Johri 2020-05-04
This book covers applications of machine learning in artificial intelligence. The specific topics covered include human language, heterogeneous and streaming data, unmanned systems, neural information processing, marketing and the social sciences, bioinformatics and robotics, etc. It also provides a broad range of techniques that can be successfully applied and adopted in different areas. Accordingly, the book offers an interesting and insightful read for scholars in the areas of computer vision, speech recognition, healthcare, business, marketing, and bioinformatics.

Principles of Compiler Design - Aho Alfred V 1998

BCPL - Martin Richards 1981-12-31
BCPL is a simple systems programming language with a portable compiler that has been implemented on many machines from large mainframes to mini computers and microprocessors. The book provides an introduction to the language, paying particular attention to programming style. In addition, it covers the more machine-independent parts of the BCPL library and outlines various debugging aids that most implementations provide. The syntax analysis phase of the compiler is

described in detail, giving a realistic example of a typical application of the language. This and other substantial examples given in the book will be of interest both to serious users of BCPL and to computer writers. There is a chapter concerned with the portability code generator design. The reference for BCPL appears as the final chapter.

Concepts in Programming Languages - John C. Mitchell 2003
A comprehensive undergraduate textbook covering both theory and practical design issues, with an emphasis on object-oriented languages.

Modern Compiler Design - Dick Grune 2012-07-20
"Modern Compiler Design" makes the topic of compiler design more accessible by focusing on principles and techniques of wide application. By carefully distinguishing between the essential (material that has a high chance of being useful) and the incidental (material that will be of benefit only in exceptional cases) much useful information was packed in this comprehensive volume. The student who has finished this book can expect to understand the workings of and add to a language processor for each of the modern paradigms, and be able to read the literature on how to proceed. The first provides a firm basis, the second potential for growth.

Advanced Compiler Design Implementation - Steven Muchnick 1997-08
Computer professionals who need to understand advanced techniques for designing efficient compilers will need this book. It provides complete coverage of advanced issues in the design of compilers, with a major emphasis on creating highly optimizing scalar compilers. It includes interviews and printed documentation from designers and implementors of real-world compilation systems.

Compiler Construction - Kenneth C. Louden 1997
This compiler design and construction text introduces students to the concepts and issues

of compiler design, and features a comprehensive, hands-on case study project for constructing an actual, working compiler
ML for the Working Programmer - Lawrence C. Paulson 1992
This new edition of a successful text treats modules in more depth, and covers the revision of ML language.

Implementing Programming Languages - Aarne Ranta 2012
Implementing a programming language means bridging the gap from the programmer's high-level thinking to the machine's zeros and ones. If this is done in an efficient and reliable way, programmers can concentrate on the actual problems they have to solve, rather than on the details of machines. But understanding the whole chain from languages to machines is still an essential part of the training of any serious programmer. It will result in a more competent programmer, who will moreover be able to develop new languages. A new language is often the best way to solve a problem, and less difficult than it may sound. This book follows a theory-based practical approach, where theoretical models serve as blueprint for actual coding. The reader is guided to build compilers and interpreters in a well-understood and scalable way. The solutions are moreover portable to different implementation languages. Much of the actual code is automatically generated from a grammar of the language, by using the BNF Converter tool. The rest can be written in Haskell or Java, for which the book gives detailed guidance, but with some adaptation also in C, C++, C#, or OCaml, which are supported by the BNF Converter. The main focus of the book is on standard imperative and functional languages: a subset of C++ and a subset of Haskell are the source languages, and Java Virtual Machine is the main target. Simple Intel x86 native code compilation is shown to complete the chain from language to machine. The last chapter leaves the standard paths and

explores the space of language design ranging from minimal Turing-complete languages to human-computer interaction in natural language.

Programming in Scala - Martin Odersky 2008 Presents an introduction to the new programming language for the Java Platform.

Modern Compiler Implementation in C - Andrew W. Appel 2004-07-08 Describes all phases of a modern compiler, including techniques in code generation and register allocation for imperative, functional and object-oriented languages.

Programming Language Pragmatics - Michael L. Scott 2015-11-30 Programming Language Pragmatics, Fourth Edition, is the most comprehensive programming language textbook available today. It is distinguished and acclaimed for its integrated treatment of language design and implementation, with an emphasis on the fundamental tradeoffs that continue to drive software development. The book provides readers with a solid foundation in the syntax, semantics, and pragmatics of the full range of programming languages, from traditional languages like C to the latest in functional, scripting, and object-oriented programming. This fourth edition has been heavily revised throughout, with expanded coverage of type systems and functional programming, a unified treatment of polymorphism, highlights of the newest language standards, and examples featuring the ARM and x86 64-bit architectures. Updated coverage of the latest developments in programming language design, including C & C++11, Java 8, C# 5, Scala, Go, Swift, Python 3, and HTML 5 Updated treatment of functional programming, with extensive coverage of OCaml New chapters devoted to type systems and composite types Unified and updated treatment of polymorphism in all its forms New examples featuring the ARM and x86 64-bit architectures **Compilers: Principles, Techniques, & Tools,**

Essentials of Programming Languages, third edition - Daniel P. Friedman 2008-04-18
A new edition of a textbook that provides students with a deep, working understanding of the essential concepts of programming languages, completely revised, with significant new material. This book provides students with a deep, working understanding of the essential concepts of programming languages. Most of these essentials relate to the semantics, or meaning, of program elements, and the text uses interpreters (short programs that directly analyze an abstract representation of the program text) to express the semantics of many essential language elements in a way that is both clear and executable. The approach is both analytical and hands-on. The book provides views of programming languages using widely varying levels of abstraction, maintaining a clear connection between the high-level and low-level views. Exercises are a vital part of the text and are scattered throughout; the text explains the key concepts, and the exercises explore alternative designs and other issues. The complete Scheme code for all the interpreters and analyzers in the book can be found online through The MIT Press web site. For this new edition, each chapter has been revised and many new exercises have been added. Significant additions have been made to the text, including completely new chapters on modules and continuation-passing style. Essentials of Programming Languages can be used for both graduate and undergraduate courses, and for continuing education courses for programmers.

The Standard ML Basis Library - Emden R. Gansner 2004-04-05
The book provides a description of the Standard ML (SML) Basis Library, the standard library for the SML language. For programmers using SML, it provides a complete description of the modules, types and functions composing the

library, which is supported by all conforming implementations of the language. The book serves as a programmer's reference, providing manual pages with concise descriptions. In addition, it presents the principles and rationales used in designing the library, and relates these to idioms and examples for using the library. A particular emphasis of the library is to encourage the use of SML in serious system programming. Major features of the library include I/O, a large collection of primitive types, support for internationalization, and a portable operating system interface. This manual will be an indispensable reference for students, professional programmers, and language designers.

Programming Language Concepts - Peter Sestoft 2017-08-31
This book uses a functional programming language (F#) as a metalanguage to present all concepts and examples, and thus has an operational flavour, enabling practical experiments and exercises. It includes basic concepts such as abstract syntax, interpretation, stack machines, compilation, type checking, garbage collection, and real machine code. Also included are more advanced topics on polymorphic types, type inference using unification, co- and contravariant types, continuations, and backwards code generation with on-the-fly peephole optimization. This second edition includes two new chapters. One describes compilation and type checking of a full functional language, tying together the previous chapters. The other describes how to compile a C subset to real (x86) hardware, as a smooth extension of the previously presented compilers.The examples present several interpreters and compilers for toy languages, including compilers for a small but usable subset of C, abstract machines, a garbage collector, and ML-style polymorphic type inference. Each chapter has exercises. Programming Language Concepts covers practical construction of lexers

and parsers, but not regular expressions, automata and grammars, which are well covered already. It discusses the design and technology of Java and C# to strengthen students' understanding of these widely used languages.
Compilers: Principles, Techniques and Tools (for Anna University), 2/e - Alfred V. Aho 2003

Crafting a Compiler - Charles N. Fischer 1988
Software -- Programming Languages.
Modern Compiler Implementation in Java - Andrew W. Appel 2007
Appel explains all phases of a modern compiler, covering current techniques in code generation and register allocation as well as functional and object-oriented languages. The book also includes a compiler implementation project using Java.
Lisp in Small Pieces - Christian Queinnec 2003-12-04
This is a comprehensive account of the semantics and the implementation of the whole Lisp family of languages, namely Lisp, Scheme and related dialects. It describes 11 interpreters and 2 compilers, including very recent techniques of interpretation and compilation. The book is in two parts. The first starts from a simple evaluation function and enriches it with multiple name spaces, continuations and side-effects with commented variants, while at the same time the language used to define these features is reduced to a simple lambda-calculus. Denotational semantics is then naturally introduced. The second part focuses more on implementation techniques and discusses precompilation for fast interpretation: threaded code or bytecode; compilation towards C. Some extensions are also described such as dynamic evaluation, reflection, macros and objects. This will become the new standard reference for people wanting to know more about the Lisp family of languages: how they work, how they are implemented, what their variants are and why such variants exist. The full code is supplied

(and also available over the Net). A large bibliography is given as well as a considerable number of exercises. Thus it may also be used by students to accompany second courses on Lisp or Scheme.

Modern Compiler Implementation in Java - Andrew W. Appel 2002-10-21
This textbook describes all phases of a compiler: lexical analysis, parsing, abstract syntax, semantic actions, intermediate representations, instruction selection via tree matching, dataflow analysis, graph-coloring register allocation, and runtime systems. It includes good coverage of current techniques in code generation and register allocation, as well as the compilation of functional and object-oriented languages, that is missing from most books. The most accepted and successful techniques are described concisely, rather than as an exhaustive catalog of every possible variant, and illustrated with actual Java classes. The first part of the book, Fundamentals of Compilation, is suitable for a one-semester first course in compiler design. The second part, Advanced Topics, which includes the compilation of object-oriented and functional languages, garbage collection, loop optimization, SSA form, instruction scheduling, and optimization for cache-memory hierarchies, can be used for a second-semester or graduate course. This new edition has been extensively rewritten to include more discussion of Java and object-oriented programming concepts, such as visitor patterns. A unique feature is the newly redesigned compiler project in Java, for a subset of Java itself. The project includes both front-end and back-end phases, so that students can build a complete working compiler in one semester.
A Retargetable C Compiler - Christopher W. Fraser 1995
This book brings a unique treatment of compiler design to the professional who seeks an in-depth examination of a real-world compiler. Chris Fraser of AT &T Bell Laboratories and David Hanson of Princeton University codeveloped lcc,

the retargetable ANSI C compiler that is the focus of this book. They provide complete source code for lcc; a target-independent front end and three target-dependent back ends are packaged as a single program designed to run on three different platforms. Rather than transfer code into a text file, the book and the compiler itself are generated from a single source to ensure accuracy.

Mathematics for Machine Learning - Marc Peter Deisenroth 2020-04-23
The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

Graph Algorithms - Mark Needham 2019-05-16
Discover how graph algorithms can help you leverage the relationships within your data to develop more intelligent solutions and enhance your machine learning models. You'll learn how graph analytics are uniquely suited to unfold complex structures and reveal difficult-to-find

patterns lurking in your data. Whether you are trying to build dynamic network models or forecast real-world behavior, this book illustrates how graph algorithms deliver value—from finding vulnerabilities and bottlenecks to detecting communities and improving machine learning predictions. This practical book walks you through hands-on examples of how to use graph algorithms in Apache Spark and Neo4j—two of the most common choices for graph analytics. Also included: sample code and tips for over 20 practical graph algorithms that cover optimal pathfinding, importance through centrality, and community detection. Learn how graph analytics vary from conventional statistical analysis Understand how classic graph algorithms work, and how they are applied Get guidance on which algorithms to use for different types of questions Explore algorithm examples with working code and sample datasets from Spark and Neo4j See how connected feature extraction can increase machine learning accuracy and precision Walk through creating an ML workflow for link prediction combining Neo4j and Spark

Hands-On Machine Learning with C++ - Kirill Kolodiazhnyi 2020-05-15
Implement supervised and unsupervised machine learning algorithms using C++ libraries such as PyTorch C++ API, Caffe2, Shogun, Shark-ML, mlpack, and dlib with the help of real-world examples and datasets Key FeaturesBecome familiar with data processing, performance measuring, and model selection using various C++ librariesImplement practical machine learning and deep learning techniques to build smart modelsDeploy machine learning models to work on mobile and embedded devicesBook Description C++ can make your machine learning models run faster and more efficiently. This handy guide will help you learn the fundamentals of machine learning (ML), showing you how to use C++ libraries to get the most out of your data. This book makes machine

learning with C++ for beginners easy with its example-based approach, demonstrating how to implement supervised and unsupervised ML algorithms through real-world examples. This book will get you hands-on with tuning and optimizing a model for different use cases, assisting you with model selection and the measurement of performance. You'll cover techniques such as product recommendations, ensemble learning, and anomaly detection using modern C++ libraries such as PyTorch C++ API, Caffe2, Shogun, Shark-ML, mlpack, and dlib. Next, you'll explore neural networks and deep learning using examples such as image classification and sentiment analysis, which will help you solve various problems. Later, you'll learn how to handle production and deployment challenges on mobile and cloud platforms, before discovering how to export and import models using the ONNX format. By the end of this C++ book, you will have real-world machine learning and C++ knowledge, as well as the

skills to use C++ to build powerful ML systems. What you will learnExplore how to load and preprocess various data types to suitable C++ data structuresEmploy key machine learning algorithms with various C++ librariesUnderstand the grid-search approach to find the best parameters for a machine learning modelImplement an algorithm for filtering anomalies in user data using Gaussian distributionImprove collaborative filtering to deal with dynamic user preferencesUse C++ libraries and APIs to manage model structures and parametersImplement a C++ program to solve image classification tasks with LeNet architectureWho this book is for You will find this C++ machine learning book useful if you want to get started with machine learning algorithms and techniques using the popular C++ language. As well as being a useful first course in machine learning with C++, this book will also appeal to data analysts, data scientists, and machine learning developers who are

looking to implement different machine learning models in production using varied datasets and examples. Working knowledge of the C++ programming language is mandatory to get started with this book.

Modern Compiler Implementation in C - Andrew W. Appel 2004-07-08

This new, expanded textbook describes all phases of a modern compiler: lexical analysis, parsing, abstract syntax, semantic actions, intermediate representations, instruction selection via tree matching, dataflow analysis, graph-coloring register allocation, and runtime systems. It includes good coverage of current techniques in code generation and register allocation, as well as functional and object-oriented languages, that are missing from most books. In addition, more advanced chapters are now included so that it can be used as the basis for a two-semester or graduate course. The most accepted and successful techniques are described in a concise way, rather than as an exhaustive catalog of every possible variant. Detailed descriptions of the interfaces between modules of a compiler are illustrated with actual C header files. The first part of the book, Fundamentals of Compilation, is suitable for a one-semester first course in compiler design. The second part, Advanced Topics, which includes the advanced chapters, covers the compilation of object-oriented and functional languages, garbage collection, loop optimizations, SSA form, loop scheduling, and optimization for cache-memory hierarchies.

Crafting a Compiler with C - Charles N. Fischer 1991-01-01

This extremely practical, hands-on approach to building compilers using the C programming language includes numerous examples of working code from a real compiler and covers such advanced topics as code generation, optimization, and real-world parsing. It is an ideal reference and tutorial. 0805321667B04062001

Compiling with Continuations - Andrew W. Appel
1992
The control and data flow of a program can be represented using continuations, a concept from denotational semantics that has practical application in real compilers. This book shows how continuation-passing style is used as an intermediate representation on which to perform optimisations and program transformations. Continuations can be used to compile most programming languages. The method is illustrated in a compiler for the programming language Standard ML. However, prior knowledge of ML is not necessary, as the author carefully explains each concept as it arises. This is the first book to show how concepts from the theory of programming languages can be applied to the producton of practical optimising compilers for modern languages like ML. This book will be essential reading for compiler writers in both industry and academe, as well as for students and researchers in programming

language theory.

Optimizing Compilers for Modern Architectures: A Dependence-Based Approach - Randy Allen 2001-10
Modern computer architectures designed with high-performance microprocessors offer tremendous potential gains in performance over previous designs. Yet their very complexity makes it increasingly difficult to produce efficient code and to realize their full potential. This landmark text from two leaders in the field focuses on the pivotal role that compilers can play in addressing this critical issue. The basis for all the methods presented in this book is data dependence, a fundamental compiler analysis tool for optimizing programs on high-performance microprocessors and parallel architectures. It enables compiler designers to write compilers that automatically transform simple, sequential programs into forms that can exploit special features of these modern architectures. The text provides a broad

introduction to data dependence, to the many transformation strategies it supports, and to its applications to important optimization problems such as parallelization, compiler memory hierarchy management, and instruction scheduling. The authors demonstrate the importance and wide applicability of dependence-based compiler optimizations and give the compiler writer the basics needed to understand and implement them. They also offer cookbook explanations for transforming applications by hand to computational scientists and engineers who are driven to obtain the best possible performance of their complex applications. The approaches presented are based on research conducted over the past two decades, emphasizing the strategies implemented in research prototypes at Rice University and in several associated commercial systems. Randy Allen and Ken Kennedy have provided an indispensable resource for researchers, practicing professionals, and graduate students engaged in designing and optimizing compilers for modern computer architectures. * Offers a guide to the simple, practical algorithms and approaches that are most effective in real-world, high-performance microprocessor and parallel systems. * Demonstrates each transformation in worked examples. * Examines how two case study compilers implement the theories and practices described in each chapter. * Presents the most complete treatment of memory hierarchy issues of any compiler text. * Illustrates ordering relationships with dependence graphs throughout the book. * Applies the techniques to a variety of languages, including Fortran 77, C, hardware definition languages, Fortran 90, and High Performance Fortran. * Provides extensive references to the most sophisticated algorithms known in research.

Writing Compilers and Interpreters - Ronald Mak 2011-03-10
Long-awaited revision to a unique guide that

covers both compilers and interpreters Revised, updated, and now focusing on Java instead of C++, this long-awaited, latest edition of this popular book teaches programmers and software engineering students how to write compilers and interpreters using Java. You?ll write compilers and interpreters as case studies, generating general assembly code for a Java Virtual Machine that takes advantage of the Java Collections Framework to shorten and simplify the code. In addition, coverage includes Java Collections Framework, UML modeling, object-oriented programming with design patterns, working with XML intermediate code, and more.

Computer Aided Verification - Ganesh Gopalakrishnan 2011-07-05
This book constitutes the refereed proceedings of the 23rd International Conference on Computer Aided Verification, CAV 2011, held in Snowbird, UT, USA, in July 2011. The 35 revised full papers presented together with 20 tool papers were carefully reviewed and selected from 161 submissions. The papers are organized in topical sections on the following workshops: 4th International Workshop on Numerical Software Verification (NSV 2011), 10th International Workshop on Parallel and Distributed Methods in Verifications (PDMC 2011), 4th International Workshop on Exploiting Concurrency Efficiently and Correctly (EC2 2011), Frontiers in Analog Circuit Synthesis and Verification (FAC 2011), International Workshop on Satisfiability Modulo Theories, including SMTCOMP (SMT 2011), 18th International SPIN Workshop on Model Checking of Software (SPIN 2011), Formal Methods for Robotics and Automation (FM-R 2011), and Practical Synthesis for Concurrent Systems (PSY 2011).

Modern Compiler Implementation in Java - Andrew W. Appel 2002-10-21
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Effective Modern C++ - Scott Meyers 2014-11-11
Coming to grips with C++11 and C++14 is more than a matter of familiarizing yourself with the features they introduce (e.g., auto type declarations, move semantics, lambda expressions, and concurrency support). The challenge is learning to use those features effectively—so that your software is correct, efficient, maintainable, and portable. That's where this practical book comes in. It describes how to write truly great software using C++11 and C++14—i.e. using modern C++. Topics include: The pros and cons of braced initialization, noexcept specifications, perfect forwarding, and smart pointer make functions The relationships among std::move, std::forward, rvalue references, and universal references Techniques for writing clear, correct, effective lambda expressions How std::atomic differs from volatile, how each should be used, and how they relate to C++'s concurrency API How best practices in "old" C++ programming (i.e., C++98) require revision for software development in modern C++ Effective Modern C++ follows the proven guideline-based,

example-driven format of Scott Meyers' earlier books, but covers entirely new material. "After I learned the C++ basics, I then learned how to use C++ in production code from Meyer's series of Effective C++ books. Effective Modern C++ is the most important how-to book for advice on key guidelines, styles, and idioms to use modern C++ effectively and well. Don't own it yet? Buy this one. Now". -- Herb Sutter, Chair of ISO C++ Standards Committee and C++ Software Architect at Microsoft

The Compiler Design Handbook - Y.N. Srikant 2002-09-25
The widespread use of object-oriented languages and Internet security concerns are just the beginning. Add embedded systems, multiple memory banks, highly pipelined units operating in parallel, and a host of other advances and it becomes clear that current and future computer architectures pose immense challenges to compiler designers-challenges th
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