

Programming Languages Design And Implementation 4th Edition

Programming language

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A programming language is an artificial language for expressing computer programs.

Programming languages typically allow software to be written in a human readable manner.

Execution of a program requires an implementation. There are two main approaches for implementing a programming language – compilation, where programs are compiled ahead-of-time to machine code, and interpretation, where programs are directly executed. In addition to these two extremes, some implementations use hybrid approaches such as just-in-time compilation and bytecode interpreters.

The design of programming languages has been strongly influenced by computer architecture, with most imperative languages designed around the ubiquitous von Neumann architecture. While early programming languages were closely tied to the...

Limbo (programming language)

programming language for writing distributed systems and is the language used to write applications for the Inferno operating system. It was designed

Limbo is a programming language for writing distributed systems and is the language used to write applications for the Inferno operating system. It was designed at Bell Labs by Sean Dorward, Phil Winterbottom, and Rob Pike.

The Limbo compiler generates architecture-independent object code which is then interpreted by the Dis virtual machine or compiled just before runtime to improve performance. Therefore all Limbo applications are completely portable across all Inferno platforms.

Limbo's approach to concurrency was inspired by Hoare's communicating sequential processes (CSP), as implemented and amended in Pike's earlier Newsqueak language and Winterbottom's Alef.

ML (programming language)

programming, it does allow side-effects (like languages such as Lisp, but unlike a purely functional language such as Haskell). Like most programming

ML (Meta Language) is a general-purpose, high-level, functional programming language. It is known for its use of the polymorphic Hindley–Milner type system, which automatically assigns the data types of most expressions without requiring explicit type annotations (type inference), and ensures type safety; there is a formal proof that a well-typed ML program does not cause runtime type errors. ML provides pattern matching for function arguments, garbage collection, imperative programming, call-by-value and currying. While a general-purpose programming language, ML is used heavily in programming language research and is one of the few languages to be completely specified and verified using formal semantics. Its types and pattern matching make it well-suited and commonly used to operate on other...

F Sharp (programming language)

strongly typed, multi-paradigm programming language that encompasses functional, imperative,

and object-oriented programming methods. It is most often used

F# (pronounced F sharp) is a general-purpose, high-level, strongly typed, multi-paradigm programming language that encompasses functional, imperative, and object-oriented programming methods. It is most often used as a cross-platform Common Language Infrastructure (CLI) language on .NET, but can also generate JavaScript and graphics processing unit (GPU) code.

F# is developed by the F# Software Foundation, Microsoft and open contributors. An open source, cross-platform compiler for F# is available from the F# Software Foundation. F# is a fully supported language in Visual Studio and JetBrains Rider. Plug-ins supporting F# exist for many widely used editors including Visual Studio Code, Vim, and Emacs.

F# is a member of the ML language family and originated as a .NET Framework implementation...

Python (programming language)

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Python is dynamically type-checked and garbage-collected. It supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional programming.

Guido van Rossum began working on Python in the late 1980s as a successor to the ABC programming language. Python 3.0, released in 2008, was a major revision not completely backward-compatible with earlier versions. Recent versions, such as Python 3.12, have added capabilities and keywords for typing (and more; e.g. increasing speed); helping with (optional) static typing. Currently only versions in the 3.x series are supported.

Python consistently ranks...

C Sharp (programming language)

and component-oriented programming disciplines. The principal inventors of the C# programming language were Anders Hejlsberg, Scott Wiltamuth, and Peter

C# (see SHARP) is a general-purpose high-level programming language supporting multiple paradigms. C# encompasses static typing, strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines.

The principal inventors of the C# programming language were Anders Hejlsberg, Scott Wiltamuth, and Peter Golde from Microsoft. It was first widely distributed in July 2000 and was later approved as an international standard by Ecma (ECMA-334) in 2002 and ISO/IEC (ISO/IEC 23270 and 20619) in 2003. Microsoft introduced C# along with .NET Framework and Microsoft Visual Studio, both of which are technically speaking, closed-source. At the time, Microsoft had no open-source products. Four years later, in 2004, a...

EGL (programming language)

providing a common language and programming model across languages, frameworks, and runtime platforms. The language borrows concepts familiar to anyone

EGL (Enterprise Generation Language), originally developed by IBM and now available as the EDT (EGL Development Tools) open source project under the Eclipse Public License (EPL), is a programming technology designed to meet the challenges of modern, multi-platform application

development by providing a common language and programming model across languages, frameworks, and runtime platforms.

Prolog

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Prolog is a logic programming language that has its origins in artificial intelligence, automated theorem proving, and computational linguistics.

Prolog has its roots in first-order logic, a formal logic. Unlike many other programming languages, Prolog is intended primarily as a declarative programming language: the program is a set of facts and rules, which define relations. A computation is initiated by running a query over the program.

Prolog was one of the first logic programming languages and remains the most popular such language today, with several free and commercial implementations available. The language has been used for theorem proving, expert systems, term rewriting, type systems, and automated planning, as well as its original intended field of use, natural language processing...

Non-English-based programming languages

trend in the history of language design. According to the HOPL online database of languages, out of the 8,500+ programming languages recorded, roughly 2,400

Non-English-based programming languages are programming languages that do not use keywords taken from or inspired by English vocabulary.

Scala (programming language)

general-purpose programming language that supports both object-oriented programming and functional programming. Designed to be concise, many of Scala's design decisions

Scala (SKAH-lah) is a strongly statically typed high-level general-purpose programming language that supports both object-oriented programming and functional programming. Designed to be concise, many of Scala's design decisions are intended to address criticisms of Java.

Scala source code can be compiled to Java bytecode and run on a Java virtual machine (JVM). Scala can also be transpiled to JavaScript to run in a browser, or compiled directly to a native executable. When running on the JVM, Scala provides language interoperability with Java so that libraries written in either language may be referenced directly in Scala or Java code. Like Java, Scala is object-oriented, and uses a syntax termed curly-brace which is similar to the language C. Since Scala 3, there is also an option to use...

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