

How Has Python Influenced Languages Developed Since



Python: The Language of Influence and Impact

Discover the power of Python, a versatile and widely used programming language. Explore its features, benefits, use cases, and exciting future prospects.

by Avleen Kaur

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Python's rise to prominence hasn't just been a story of its own success; it's a narrative interwoven with the evolution of other programming languages. Its elegant syntax, extensive libraries, and philosophy of readability have left an undeniable mark on the development of numerous languages that followed. This post delves into the specific ways Python's influence can be seen in modern programming languages, exploring its impact on syntax, design principles, and the broader programming ecosystem. We'll examine how its features have been adopted, adapted, and even challenged, painting a comprehensive picture of Python's lasting legacy.

Python's Impact on Syntax and Readability

Python's clean and intuitive syntax is arguably its most significant contribution to the evolution of programming languages. Before Python's widespread adoption, many languages relied on verbose or complex syntax, often leading to code that was difficult to read and maintain.

Emphasis on Whitespace

Python's groundbreaking use of indentation to define code blocks, rather than relying on brackets or

keywords like ``begin`` and ``end``, forced a shift in how programmers approached code structure. This unconventional approach initially met with resistance but ultimately promoted cleaner, more consistent code across projects. Languages like CoffeeScript and even some aspects of Swift's syntax were subtly influenced by this emphasis on whitespace, aiming for similar readability benefits.

Clear and Concise Syntax

Python's minimalist syntax, favoring clear keywords and straightforward expressions, inspired developers to pursue similar clarity in subsequent languages. The avoidance of unnecessary punctuation and complex grammar contributed to its popularity, leading other languages to prioritize readability and minimize syntactic noise. This is evident in languages like Go, which aims for simplicity and efficiency in its syntax, echoing Python's design philosophy.

The Influence on Dynamic Typing and Interpreted Environments

Python's dynamic typing system and interpreted nature offered developers a rapid prototyping environment and improved development speed. This feature wasn't entirely novel, but Python's success highlighted its advantages.

Increased Adoption of Dynamic Typing

Languages like Ruby, JavaScript, and even aspects of newer versions of PHP show the increased acceptance of dynamic typing, inspired by Python's demonstration of its practicality. While static typing offers advantages in larger projects, the speed and ease of development afforded by dynamic typing continue to make it attractive, particularly for rapid prototyping and scripting tasks.

Embracing Interactive Development

Python's interactive interpreter (REPL) fostered a culture of exploratory programming and experimentation. This approach influenced the development of similar interactive environments in other languages, enabling developers to test code snippets and debug more efficiently. This focus on interactive development has been adopted and enhanced in many modern languages and IDEs.

Python's Impact on Libraries and Frameworks

Python's rich ecosystem of libraries and frameworks is another key factor in its influence. Its success is not solely attributed to the language itself, but also to the robust tools built around it.

Inspiring Ecosystem Development

The ease of creating and extending Python libraries encouraged a vibrant community that contributed numerous tools for data science, machine learning, web development, and more. This emphasis on a strong library ecosystem spurred the development of similar frameworks in other languages. For example, the popularity of Python's NumPy and SciPy libraries directly influenced the creation of similar numerical computing libraries in other languages like Julia.

Impact on Web Frameworks

Python's Django and Flask frameworks significantly impacted the way web applications are developed. Their elegance and ease of use inspired similar frameworks in other languages, emphasizing rapid development, scalability, and efficient code organization.

The Broader Philosophical Influence

Beyond specific syntactic features or libraries, Python's philosophy of readability and "batteries-included" (providing a wealth of standard libraries) had a profound impact on the overall approach to language design.

Readability as a Priority

Python's emphasis on readable code isn't just a stylistic choice; it's a core design principle. This influenced the development of other languages that prioritize code clarity and maintainability, making them easier to learn and collaborate on.

Community and Collaboration

Python's success is partly due to its welcoming and supportive community. This collaborative spirit has influenced the development of other languages, emphasizing community engagement and open-source contribution.

Conclusion

Python's impact on the development of programming languages since its inception is undeniable. Its influence extends beyond individual features, encompassing syntax, design philosophies, and the overall programming ecosystem. From the widespread adoption of dynamic typing to the emphasis on readability and a thriving community, Python's legacy is woven into the fabric of modern programming. The languages that have followed have learned from its successes, adapted its features, and ultimately shaped the landscape of software development in ways that continue to evolve.

FAQs

1. Does Python's influence mean other languages are becoming clones? No, while Python has influenced aspects of other languages, they retain their unique features and cater to different programming paradigms. The influence is more about adopting best practices and beneficial features rather than outright imitation.
2. Has Python's influence been entirely positive? While mostly positive, Python's dynamic typing can lead to runtime errors that statically typed languages catch during compilation. This trade-off between development speed and runtime safety is a point of ongoing discussion.
3. What languages have been least influenced by Python? Languages with significantly different paradigms, like functional programming languages (e.g., Haskell) or low-level languages (e.g., C), show less direct Python influence. However, even these languages have likely benefited indirectly from the broader trends Python has helped establish.
4. Will Python's influence continue to grow? Python's continued popularity in data science and machine learning ensures its influence will likely persist. However, the specific nature of this influence may shift as new programming paradigms and languages emerge.
5. Can we predict future languages based on Python's influence? It's impossible to definitively predict future languages, but we can expect continued emphasis on readability, strong community support, and robust libraries, all reflecting Python's lasting impact.

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Richard L. Wexelblat, 2014-05-27 History of Programming Languages presents information pertinent to the technical aspects of the language design and creation. This book provides an understanding of the processes of language design as related to the environment in which languages are developed and the knowledge base available to the originators. Organized into 14 sections encompassing 77 chapters, this book begins with an overview of the programming techniques to use to help the system produce efficient programs. This text then discusses how to use parentheses to help the system identify identical subexpressions within an expression and thereby eliminate their duplicate calculation. Other chapters consider FORTRAN programming techniques needed to produce optimum object programs. This book discusses as well the developments leading to ALGOL 60. The final chapter presents the biography of Adin D. Falkoff. This book is a valuable resource for graduate students, practitioners, historians, statisticians, mathematicians, programmers, as well as computer scientists and specialists.

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Brian W. Kernighan, Dennis M. Ritchie, 2017-07-13 C++ was written to help professional C# developers learn modern C++ programming. The aim of this book is to leverage your existing C# knowledge in order to expand your skills. Whether you need to use C++ in an upcoming project, or simply want to learn a new language (or reacquaint yourself with it), this book will help you learn all of the fundamental pieces of C++ so you can begin writing your own C++ programs. This updated and expanded second edition of Book provides a user-friendly introduction to the subject, Taking a clear structural framework, it guides the reader through the subject's core elements. A flowing writing style combines with the use of illustrations and diagrams throughout the text to ensure the reader understands even the most complex of concepts. This succinct and enlightening overview is a required reading for all those interested in the subject. We hope you find this book useful in shaping your future career & Business.

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Mark Summerfield, 2008-12-16 Python 3 is the best version of the language yet: It is more powerful, convenient, consistent, and expressive than ever before. Now, leading Python programmer Mark Summerfield demonstrates how to write code that takes full advantage of Python 3's features and idioms. The first book written from a completely "Python 3" viewpoint, Programming in Python 3 brings together all the knowledge you need to write any program, use any standard or third-party Python 3 library, and create new library modules of your own. Summerfield draws on his many years of Python experience to share deep insights into Python 3 development you won't find anywhere else. He begins by illuminating Python's "beautiful heart": the eight key elements of Python you need to write robust, high-performance programs. Building on these core elements, he introduces new topics designed to strengthen your practical expertise—one concept and hands-on example at a time. This book's coverage includes Developing in Python using procedural, object-oriented, and functional programming paradigms Creating custom packages and modules Writing and reading binary, text, and XML files, including optional compression, random access, and text and XML parsing Leveraging advanced data types, collections, control structures, and functions Spreading program workloads across multiple processes and threads Programming SQL databases and key-value DBM files Utilizing Python's regular expression mini-language and module Building usable, efficient, GUI-based applications Advanced programming techniques, including generators, function and class decorators, context managers, descriptors, abstract base classes, metaclasses, and more Programming in Python 3 serves as both tutorial and language reference, and it is accompanied by extensive downloadable example code—all of it tested with the final version of Python 3 on Windows, Linux, and Mac OS X.

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Python Prateek Joshi, 2017-01-27 Build real-world Artificial Intelligence applications with Python to intelligently interact with the world around you About This Book Step into the amazing world of intelligent apps using this comprehensive guide Enter the world of Artificial Intelligence, explore it,

and create your own applications Work through simple yet insightful examples that will get you up and running with Artificial Intelligence in no time Who This Book Is For This book is for Python developers who want to build real-world Artificial Intelligence applications. This book is friendly to Python beginners, but being familiar with Python would be useful to play around with the code. It will also be useful for experienced Python programmers who are looking to use Artificial Intelligence techniques in their existing technology stacks. What You Will Learn Realize different classification and regression techniques Understand the concept of clustering and how to use it to automatically segment data See how to build an intelligent recommender system Understand logic programming and how to use it Build automatic speech recognition systems Understand the basics of heuristic search and genetic programming Develop games using Artificial Intelligence Learn how reinforcement learning works Discover how to build intelligent applications centered on images, text, and time series data See how to use deep learning algorithms and build applications based on it In Detail Artificial Intelligence is becoming increasingly relevant in the modern world where everything is driven by technology and data. It is used extensively across many fields such as search engines, image recognition, robotics, finance, and so on. We will explore various real-world scenarios in this book and you'll learn about various algorithms that can be used to build Artificial Intelligence applications. During the course of this book, you will find out how to make informed decisions about what algorithms to use in a given context. Starting from the basics of Artificial Intelligence, you will learn how to develop various building blocks using different data mining techniques. You will see how to implement different algorithms to get the best possible results, and will understand how to apply them to real-world scenarios. If you want to add an intelligence layer to any application that's based on images, text, stock market, or some other form of data, this exciting book on Artificial Intelligence will definitely be your guide! Style and approach This highly practical book will show you how to implement Artificial Intelligence. The book provides multiple examples enabling you to create smart applications to meet the needs of your organization. In every chapter, we explain an algorithm, implement it, and then build a smart application.

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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.

how has python influenced languages developed since: Coders at Work Peter Seibel, 2009-12-21 Peter Seibel interviews 15 of the most interesting computer programmers alive today in *Coders at Work*, offering a companion volume to Apress's highly acclaimed best-seller *Founders at Work* by Jessica Livingston. As the words "at work" suggest, Peter Seibel focuses on how his interviewees tackle the day-to-day work of programming, while revealing much more, like how they became great programmers, how they recognize programming talent in others, and what kinds of problems they find most interesting. Hundreds of people have suggested names of programmers to interview on the *Coders at Work* web site: www.codersatwork.com. The complete list was 284 names. Having digested everyone's feedback, we selected 15 folks who've been kind enough to agree to be interviewed: Frances Allen: Pioneer in optimizing compilers, first woman to win the Turing Award (2006) and first female IBM fellow Joe Armstrong: Inventor of Erlang Joshua Bloch: Author of the Java collections framework, now at Google Bernie Cosell: One of the main software guys behind the original ARPANET IMPs and a master debugger Douglas Crockford: JSON founder, JavaScript architect at Yahoo! L. Peter Deutsch: Author of Ghostscript, implementer of Smalltalk-80 at Xerox PARC and Lisp 1.5 on PDP-1 Brendan Eich: Inventor of JavaScript, CTO of the Mozilla Corporation Brad Fitzpatrick: Writer of LiveJournal, OpenID, memcached, and Perlbal Dan Ingalls: Smalltalk implementor and designer Simon Peyton Jones: Coinventor of Haskell and lead designer of Glasgow Haskell Compiler Donald Knuth: Author of *The Art of Computer Programming* and creator of TeX Peter Norvig: Director of Research at Google and author of the standard text on AI Guy Steele: Coinventor of Scheme and part of the Common Lisp Gang of Five, currently working on Fortress Ken Thompson: Inventor of UNIX Jamie Zawinski: Author of XEmacs and early Netscape/Mozilla hacker

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examining the motivation of programming languages not just their features

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- Python Svein Linge, Hans Petter Langtangen, 2016-07-25 This book presents computer programming as a key method for solving mathematical problems. There are two versions of the book, one for MATLAB and one for Python. The book was inspired by the Springer book TCSE 6: A Primer on Scientific Programming with Python (by Langtangen), but the style is more accessible and concise, in keeping with the needs of engineering students. The book outlines the shortest possible path from no previous experience with programming to a set of skills that allows the students to write simple programs for solving common mathematical problems with numerical methods in engineering and science courses. The emphasis is on generic algorithms, clean design of programs, use of functions, and automatic tests for verification.

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Cristina Videira Lopes, 2014-06-02 Using a simple computational task (term frequency) to illustrate different programming styles, Exercises in Programming Style helps readers understand the various ways of writing programs and designing systems. It is designed to be used in conjunction with code provided on an online repository. The book complements and explains the raw code in a way that is accessible to anyone who regularly practices the art of programming. The book can also be used in advanced programming courses in computer science and software engineering programs. The book contains 33 different styles for writing the term frequency task. The styles are grouped into nine categories: historical, basic, function composition, objects and object interactions, reflection and metaprogramming, adversity, data-centric, concurrency, and interactivity. The author verbalizes the constraints in each style and explains the example programs. Each chapter first presents the constraints of the style, next shows an example program, and then gives a detailed explanation of the code. Most chapters also have sections focusing on the use of the style in systems design as well as sections describing the historical context in which the programming style emerged.

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Francesco Cesarini, Simon Thompson, 2009-06-11 This book is an in-depth introduction to Erlang, a programming language ideal for any situation where concurrency, fault tolerance, and fast response is essential. Erlang is gaining widespread adoption with the advent of multi-core processors and their new scalable approach to concurrency. With this guide you'll learn how to write complex concurrent programs in Erlang, regardless of your programming background or experience. Written by leaders of the international Erlang community -- and based on their training material -- Erlang Programming focuses on the language's syntax and semantics, and explains pattern matching, proper lists, recursion, debugging, networking, and concurrency. This book helps you: Understand the strengths of Erlang and why its designers included specific features Learn the concepts behind concurrency and Erlang's way of handling it Write efficient Erlang programs while keeping code neat and readable Discover how Erlang fills the requirements for distributed systems Add simple graphical user interfaces with little effort Learn Erlang's tracing mechanisms for debugging concurrent and distributed systems Use the built-in Mnesia database and other table storage features Erlang Programming provides exercises at the end of each chapter and simple examples throughout the book.

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Federico Biancuzzi, Chromatic, 2009-03-21 Masterminds of Programming features exclusive interviews with the creators of several historic and highly influential programming languages. In this unique collection, you'll learn about the processes that led to specific design decisions, including the goals they had in mind, the trade-offs they had to make, and how their experiences have left an impact on programming today. Masterminds of Programming includes individual interviews with: Adin D. Falkoff: APL Thomas E. Kurtz: BASIC Charles H. Moore: FORTH Robin Milner: ML Donald D. Chamberlin: SQL Alfred Aho, Peter Weinberger, and Brian Kernighan: AWK Charles Geschke and John Warnock: PostScript Bjarne Stroustrup: C++ Bertrand Meyer: Eiffel Brad Cox and Tom Love: Objective-C Larry Wall: Perl Simon Peyton Jones, Paul Hudak, Philip Wadler, and John Hughes:

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Alan A. A. Donovan, Brian W. Kernighan, 2015-11-16 The Go Programming Language is the authoritative resource for any programmer who wants to learn Go. It shows how to write clear and idiomatic Go to solve real-world problems. The book does not assume prior knowledge of Go nor experience with any specific language, so you'll find it accessible whether you're most comfortable with JavaScript, Ruby, Python, Java, or C++. The first chapter is a tutorial on the basic concepts of Go, introduced through programs for file I/O and text processing, simple graphics, and web clients and servers. Early chapters cover the structural elements of Go programs: syntax, control flow, data types, and the organization of a program into packages, files, and functions. The examples illustrate many packages from the standard library and show how to create new ones of your own. Later chapters explain the package mechanism in more detail, and how to build, test, and maintain projects using the go tool. The chapters on methods and interfaces introduce Go's unconventional approach to object-oriented programming, in which methods can be declared on any type and interfaces are implicitly satisfied. They explain the key principles of encapsulation, composition, and substitutability using realistic examples. Two chapters on concurrency present in-depth approaches to this increasingly important topic. The first, which covers the basic mechanisms of goroutines and channels, illustrates the style known as communicating sequential processes for which Go is renowned. The second covers more traditional aspects of concurrency with shared variables. These chapters provide a solid foundation for programmers encountering concurrency for the first time. The final two chapters explore lower-level features of Go. One covers the art of metaprogramming using reflection. The other shows how to use the unsafe package to step outside the type system for special situations, and how to use the cgo tool to create Go bindings for C libraries. The book features hundreds of interesting and practical examples of well-written Go code that cover the whole language, its most important packages, and a wide range of applications. Each chapter has exercises to test your understanding and explore extensions and alternatives. Source code is freely available for download from <http://gopl.io/> and may be conveniently fetched, built, and installed using the go get command.

how has python influenced languages developed since: 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.

how has python influenced languages developed since: Real World Haskell Bryan

O'Sullivan, John Goerzen, Donald Bruce Stewart, 2008-11-15 This easy-to-use, fast-moving tutorial introduces you to functional programming with Haskell. You'll learn how to use Haskell in a variety of practical ways, from short scripts to large and demanding applications. Real World Haskell takes

you through the basics of functional programming at a brisk pace, and then helps you increase your understanding of Haskell in real-world issues like I/O, performance, dealing with data, concurrency, and more as you move through each chapter.

how has python influenced languages developed since: Foundations of Programming Languages Kent D. Lee, 2015-01-19 This clearly written textbook introduces the reader to the three styles of programming, examining object-oriented/imperative, functional, and logic programming. The focus of the text moves from highly prescriptive languages to very descriptive languages, demonstrating the many and varied ways in which we can think about programming. Designed for interactive learning both inside and outside of the classroom, each programming paradigm is highlighted through the implementation of a non-trivial programming language, demonstrating when each language may be appropriate for a given problem. Features: includes review questions and solved practice exercises, with supplementary code and support files available from an associated website; provides the foundations for understanding how the syntax of a language is formally defined by a grammar; examines assembly language programming using CoCo; introduces C++, Standard ML, and Prolog; describes the development of a type inference system for the language Small.

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Combining GIS concepts and fundamental spatial thinking methodology with real programming examples, this book introduces popular Python-based tools and their application to solving real-world problems. It elucidates the programming constructs of Python with its high-level toolkits and demonstrates its integration with ArcGIS Theory. Filled with hands-on computer exercises in a logical learning workflow this book promotes increased interactivity between instructors and students while also benefiting professionals in the field with vital knowledge to sharpen their programming skills. Readers receive expert guidance on modules, package management, and handling shapefile formats needed to build their own mini-GIS. Comprehensive and engaging commentary, robust contents, accompanying datasets, and classroom-tested exercises are all housed here to permit users to become competitive in the GIS/IT job market and industry.

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Andrei Alexandrescu, 2010-06-02 D is a programming language built to help programmers address the challenges of modern software development. It does so by fostering modules interconnected through precise interfaces, a federation of tightly integrated programming paradigms, language-enforced thread isolation, modular type safety, an efficient memory model, and more. The D Programming Language is an authoritative and comprehensive introduction to D. Reflecting the author's signature style, the writing is casual and conversational, but never at the expense of focus and precision. It covers all aspects of the language (such as expressions, statements, types, functions, contracts, and modules), but it is much more than an enumeration of features. Inside the book you will find In-depth explanations, with idiomatic examples, for all language features How feature groups support major programming paradigms Rationale and best-use advice for each major feature Discussion of cross-cutting issues, such as error handling, contract programming, and concurrency Tables, figures, and "cheat sheets" that serve as a handy quick reference for day-to-day problem solving with D Written for the working programmer, The D Programming Language not only introduces the D language—it presents a compendium of good practices and idioms to help both your coding with D and your coding in general.

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Bjarne Stroustrup, 2000 The most widely read and trusted guide to the C++ language, standard library, and design techniques includes significant new updates and two new appendices on internationalization and Standard Library technicalities. It is the only book with authoritative, accessible coverage of every major element of ISO/ANSI Standard C++.

how has python influenced languages developed since: Code Charles Petzold, 2022-08-02

The classic guide to how computers work, updated with new chapters and interactive graphics For me, Code was a revelation. It was the first book about programming that spoke to me. It started with a story, and it built up, layer by layer, analogy by analogy, until I understood not just the Code, but the System. Code is a book that is as much about Systems Thinking and abstractions as it is about code and programming. Code teaches us how many unseen layers there are between the computer systems that we as users look at every day and the magical silicon rocks that we infused with lightning and taught to think. - Scott Hanselman, Partner Program Director, Microsoft, and host of Hanselminutes Computers are everywhere, most obviously in our laptops and smartphones, but also our cars, televisions, microwave ovens, alarm clocks, robot vacuum cleaners, and other smart appliances. Have you ever wondered what goes on inside these devices to make our lives easier but occasionally more infuriating? For more than 20 years, readers have delighted in Charles Petzold's illuminating story of the secret inner life of computers, and now he has revised it for this new age of computing. Cleverly illustrated and easy to understand, this is the book that cracks the mystery. You'll discover what flashlights, black cats, seesaws, and the ride of Paul Revere can teach you about computing, and how human ingenuity and our compulsion to communicate have shaped every electronic device we use. This new expanded edition explores more deeply the bit-by-bit and gate-by-gate construction of the heart of every smart device, the central processing unit that combines the simplest of basic operations to perform the most complex of feats. Petzold's companion website, CodeHiddenLanguage.com, uses animated graphics of key circuits in the book to make

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