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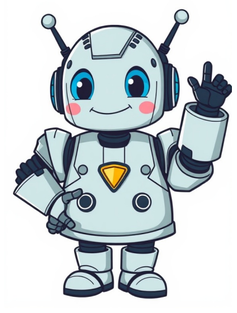

Python is a highly sought-after programming language due to its versatility and extensive use in various fields like Machine Learning, Artificial Intelligence, web development, IoT, and more. This beginner-friendly Python tutorial aims to provide a comprehensive understanding of the basic to advanced concepts of the Python Programming Language, enabling readers to become proficient in no time. By completing this tutorial, individuals will gain expertise in Python, allowing them to progress further and become world-class Software Engineers. Python is an interpreted language that supports multiple programming paradigms, including Procedural, Object-Oriented, and Functional programming. Its design philosophy emphasizes code readability through the use of significant indentation, making it a favorite among developers. This tutorial will take readers on a journey from basic concepts to advanced levels, providing a solid foundation in Python. To get started with Python programming, one must begin with the "Hello, World!" program using the print() function. The tutorial also offers an online compiler that allows users to edit and execute code directly from their browser without setting up a development environment. This feature makes it easy for beginners to try out different examples and experiment with code. Python is known for its characteristics such as support for functional and structured programming methods, OOP, scripting language capabilities, dynamic data types, automatic garbage collection, and seamless integration with other languages like C, C++, COM, ActiveX, CORBA, and Java. Its applications extend to Data Science, web development using frameworks like Django and Pyramid, computer vision, image processing, automation, job scheduling, GUI development, and more. Some of the notable features of Python include its ease of learning due to a simple syntax, readability, and maintainability. It also boasts a broad standard library that is portable and cross-platform compatible, making it an ideal choice for developers. Additionally, Python's interactive mode allows for testing and debugging of code snippets, while its extendable nature enables users to add low-level modules to the interpreter. Overall, this tutorial aims to provide a comprehensive understanding of Python programming language, enabling readers to become proficient in no time and progress further in their careers as Software Engineers.Python is a versatile and widely used programming language that has gained popularity due to its simplicity and high demand in the job market. It is an interpreted language, which means it does not require compilation before execution, making it easy to learn and use. # Python's Structure and Support Python provides a better structure and support for large programs compared to shell scripting. This makes it a scalable option for developers who need to work on complex projects. # Database Handling with Python The following tutorials will help you learn how to work with different databases using Python programming: Python Reference The complete function and method references − Python Practice Practice Python from the below-given links: Python Quick Guide Python Online Quiz Python Interview Questions & Answers Python Exercises # High Demand for Python Programmers Today, Python is very high in demand, and all the major companies are looking for great Python programmers to develop websites, software components, and applications or to work with data science, AI, and ML technologies. The market demands a greater number of Python programmers due to its applications in machine learning, artificial intelligence, etc. # Salary Expectations When we are developing this tutorial in 2022, there is a high shortage of Python programmers, where the market demands a greater number of Python programmers due to its applications in machine learning, artificial intelligence, etc. Today, a Python programmer with 3-5 years of experience is asking for around $150,000 in an annual package. # Companies That Use Python Many big companies are using Python, including: Google Intel NASA PayPal Facebook IBM Amazon Netflix Pinterest Uber Many more... So, you could be the next potential employee for any of these major companies. # Why Learn Python? Python is consistently rated as one of the world's most popular programming languages. Python is fairly easy to learn, so if you are starting to learn any programming language, then Python could be your great choice. # Advantages of Learning Python Python has many advantages that make it a top choice among programmers: Python is open source, which means it's available free of cost. Python is simple and so easy to learn. Python is versatile and can be used to create many different things.Python Although it is a beginner's tutorial, we assume that the readers have a reasonable exposure to any programming environment and knowledge of basic concepts such as variables, commands, syntax, etc. Python Questions & Answers You can explore a set of Python Questions and Answers at Python Questions & Answers Today, Python is one of the most popular programming languages. Although it is a general-purpose language, it is used in various areas of applications such as Machine Learning, Artificial Intelligence, web development, IoT, and more. This Python tutorial has been written for the beginners to help them understand the basic to advanced concepts of Python Programming Language. After completing this tutorial, you will find yourself at a great level of expertise in Python, from where you can take yourself to the next levels to become a world class Software Engineer. This Python tutorial is based on the latest Python 3.13 version. Python is a very popular general-purpose interpreted, interactive, object-oriented, and high-level programming language. Python is dynamically-typed and garbage-collected programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). Python supports multiple programming paradigms, including Procedural, Object Oriented and Functional programming language. Python design philosophy emphasizes code readability with the use of significant indentation. This Python tutorial gives a complete understanding of Python programming language, starting from basic concepts to advanced concepts. This tutorial will take you through simple and practical approaches while learning Python Programming language. Python "Hello, World!" To start with Python programming, the very basic program is to print "Hello, World!" You can use the print() function. Below is an example of Python code to print "Hello, World!" − # Python code to print "Hello, World!" print ("Hello, World!") Python Online Compiler Our Python programming tutorial provides various examples to explain different concepts. We have provided Online Python Compiler/Interpreter. You can Edit and Execute almost all the examples directly from your browser without the need to set up your development environment. Try to click the icon to run the following Python code to print conventional "Hello, World!". Below code box allows you to change the value of the code. Try to change the value inside print() and run it again to verify the result. # This is my first Python program. # This will print 'Hello, World!' as the output print ("Hello, World!"); Characteristics of Python Following are important characteristics of Python Programming − It supports functional and structured programming methods as well as OOP. It can be used as a scripting language or can be compiled to byte-code for building large applications. It provides very high-level dynamic data types and supports dynamic type checking. It supports automatic garbage collection. It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java. Applications of Python Python is a general purpose programming language known for its readability. It is widely applied in various fields. In Data Science, Python libraries like Numpy, Pandas, and Matplotlib are used for data analysis and visualization. Python frameworks like Django, and Pyramid, make the development and deployment of Web Applications easy. This programming language also extends its applications to computer vision and image processing. It is also favored in many tasks like Automation, Job Scheduling, GUI development, etc. Features of Python The latest release of Python is 3.x. As mentioned before, Python is one of the most widely used languages on the web. I'm going to list a few of them here: Easy-to-learn − Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly. Easy-to-read − Python code is more clearly defined and visible to the eyes. Easy-to-maintain − Python's source code is fairly easy-to-maintain. A broad standard library − Python's bulk of the library is very portable and cross-platform compatible on UNIX, Windows, and Macintosh. Interactive Mode − Python has support for an interactive mode that allows interactive testing and debugging of snippets of code. Portable − Python can run on a wide variety of hardware platforms and has the same interface on all platforms. Extendable − You can add low-level modules to thePython: The Most Popular and In-Demand Programming Language ========== Python is a versatile programming language that enables programmers to add custom features to their tools, interact with various databases, and develop scalable applications. With its extensive support for GUI programming, databases, and large programs, Python has become a top choice among developers. The demand for skilled Python programmers is high, with many major companies looking for experts to work on websites, software components, data science, AI, and ML technologies. A Python programmer with 3-5 years of experience can expect an annual salary of around $150,000. Many prominent companies use Python, including Google, Intel, NASA, PayPal, Facebook, IBM, Amazon, Netflix, Pinterest, and Uber. Learning Python can open doors to various career opportunities in game development, web design, full-stack development, machine learning engineering, data science, and software engineering. Python is an excellent choice for beginners due to its simplicity and ease of use. It's a great language for processing text, creating web browsers, and developing games. The language supports object-oriented programming, interactive coding, and has powerful development libraries. The benefits of learning Python include: - It's an interpreted language, eliminating the need for compilation. - It provides interactive coding capabilities, allowing developers to write programs directly in the interpreter. - It supports object-oriented programming, enabling developers to encapsulate code within objects. - It's a beginner-friendly language, suitable for developing a wide range of applications. Python is also open-source and free, making it an attractive choice for many developers. The current stable version of Python is 3.13, and the next version, 3.14, is still in development with new features and improvements. Overall, Python is a popular programming language that offers numerous benefits, including versatility, simplicity, and high demand in the job market.Python Programming Tutorial for Beginners: From Basics to Advanced Concepts ========== has been prepared for the beginners to help them understand the basics to advanced concepts of Python programming language. After completing this tutorial, you will find yourself at a great level of expertise in Python programming, from where you can take yourself to the next levels. Prerequisites to Learn Python Although it is a beginners tutorial, we assume that the readers have a reasonable exposure to any programming environment and knowledge of basic concepts such as variables, commands, syntax, etc. You can explore a set of Python Questions and Answers at Python Questions & Answers Today, Python is one of the most popular programming languages. Although it is a general-purpose language, it is used in various areas of applications such as Machine Learning, Artificial Intelligence, web development, IoT, and more. This Python tutorial has been written for the beginners to help them understand the basic to advanced concepts of Python Programming Language. 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Try to change the value inside print() and run it again to verify the result. # This is my first Python program. # This will print 'Hello, World!' as the output print ("Hello, World!"); Characteristics of Python Following are important characteristics of Python Programming − It supports functional and structured programming methods as well as OOP. It can be used as a scripting language or can be compiled to byte-code for building large applications. It provides very high-level dynamic data types and supports dynamic type checking. It supports automatic garbage collection. It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java. Applications of Python Python is a general purpose programming language known for its readability. It is widely applied in various fields. In Data Science, Python libraries like Numpy, Pandas, and Matplotlib are used for data analysis and visualization. Python frameworks like Django, and Pyramid, make the development and deployment of Web Applications easy. This programming language also extends its applications to computer vision and image processing. It is also favored in many tasks like Automation, Job Scheduling, GUI development, etc. Features of Python The latest release of Python is 3.x. As mentioned before, Python is one of the most widely used languages on the web. I'm going to list a few of them here: Easy-to-learn − Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly. Easy-to-read − Python code is more clearly defined and visible to the eyes.Python − A Versatile and In-Demand Language ========== Python has support for an interactive mode that allows testing and debugging of code snippets in a portable way. It can run on various hardware platforms with the same interface, making it easy to customize tools. You can add low-level modules to the Python interpreter to enhance its efficiency. The language provides interfaces to major commercial databases, enabling seamless data management. Python supports GUI applications that can be created and ported across multiple systems. Its scalability makes it suitable for large programs, providing a better structure than shell scripting. Python 3.14 Enters Development Phase with New Features ========== Python 3.14 is still in its development phase, incorporating numerous new features and modifications. The latest release includes PEP 649: Deferred evaluation of annotations, PEP 741: Python configuration C API, and PEP 761: Sigstore replaces PGP signatures for verification. Moreover, improved error messages are expected to enhance user experience. ========== Target Audience for Learning Python ---------- Who Can Learn Python? This tutorial is designed for beginners aiming to grasp the fundamentals and advanced concepts of Python programming language. Upon completion, learners will achieve a high level of expertise in Python programming, enabling them to advance their skills further. ========== Prerequisites for Learning Python ---------- Although this tutorial assumes basic knowledge of variables, commands, syntax, etc., it is recommended that readers have some exposure to a programming environment. This foundation is essential for understanding the intricacies of Python programming. ========== Exploring Python Questions & Answers ---------- For those seeking clarity on Python-related queries, Python Questions & Answers provides a comprehensive resource with a set of questions and answers. This tutorial aims to equip learners with in-depth knowledge of Python basics and advanced concepts, covering topics like installation, conditional statements, loops, built-in data structures, Object-Oriented Programming, Generators, Exception Handling, Python RegEx, and more. ========== Understanding the Basics of Python ---------- Python is a general-purpose, dynamically typed, high-level, compiled, interpreted, garbage-collected, and purely object-oriented programming language. It supports procedural, object-oriented, and functional programming. A simple "Hello World" program in Python consists of just one line of code, requiring minimal syntax to print 'Hello World'. ========== Why Learn Python? ---------- Python boasts numerous useful features that make it a popular choice among developers. Its simplicity, extensive libraries, and support for various frameworks and libraries create an ideal environment for learning and growth. With its ease of use, beginner-friendly design, standard libraries, community support, and high-level abstraction, Python is an excellent language to begin with. ========== Object-Oriented Language in Python ---------- Python supports object-oriented programming, allowing developers to write reusable and modular code easily. This feature enables the creation of scalable, highly maintainable, and reusable software. ========== GUI Programming Support in Python ---------- Several GUI frameworks like Tkinter, PyQt, wxPython, and PySimpleGUI enable developers to create desktop applications with ease. These features are helpful in creating Widgets, Event-driven programming, Layout Management, and Event handling. ========== Dynamic Memory Allocation in Python ---------- Python automatically manages memory allocation, making it easier for developers to write complex programs without worrying about memory management. Key aspects include Automatic Memory Management, Heap Memory, and Dynamic Data Structures. ========== Libraries and Frameworks in Python ---------- Python has a vast collection of libraries and frameworks like NumPy, Pandas, Django, and Flask. These frameworks are used in developing web applications and other fields like Backtrader, Robotics, Data Science, Machine Learning, Web Scraping, and API Interaction. ========== Versatility of Python ---------- Python's versatility means it can be applied to a wide range of domains and purposes. Its key features include being a general-purpose language, having a standard library and ecosystem, readability and simplicity, supporting multiple programming paradigms, and cross-platform compatibility. ========== Applications of Python ---------- Python is used in almost every technical field. The various areas where Python is employed include Data Science, Artificial Intelligence, Web Development, Scientific Computing, Automation, and more. Its simplicity, ease of use, and availability of powerful libraries make it an ideal choice for these applications.Looking forward to using Pytorch.Machine Learning: because of simplicity, ease of use and powerful machine learning libraries.Data Analysis: Python is used for creating visualizations of data. It is also used to analyze price trends and market predictions and automate workflows across multiple data sources.Web Development: Python is used to develop websites and web applications. There are several popular frameworks, like Django and Flask, which are used to build web applications.Python Popular Frameworks and LibrariesPython has a wide range of libraries and frameworks widely used in various fields such as machine learning, artificial intelligence, web applications, etc. We define some popular frameworks and libraries of Python as follows.Web development (Server-side): Django, Flask, Pyramid, CherryPyGUI-based applications: Tkinter, PyGTK, PyQt, PyJS, etc.Machine Learning: TensorFlow, PyTorch, Scikit-learn, Matplotlib, Scipy, etc.Mathematics: NumPy, Pandas, etc.BeautifulSoup: This library is used in web scraping and parsing HTML and XMLRequests: It is used for making HTTP requestsSQLAlchemy: It is used in SQL databasesKivy: It is a framework for building applicationsPygame: This library is used in the game development fieldPytest: A testing framework for Python DjangoREST framework: This is a toolkit for creating RESTful APIsFastAPI: A modern, fast web framework for creating APIsStreamlit: A library for developing interactive web apps for machine learning and data scienceNLTK: It is a library for natural language processingThis section will cover the basic concepts of Python programming, including an introduction to Python, History, Python Applications, Installing Python, Hello World Program, Comments, Keywords, Literals, and operators.Python Variables and Data TypesThis section of Python Tutorial covers some important topics such as understanding the Variables, Data types, Numbers, Type Casting, Strings, and Boolean.Python Control StatementsIn this section of the tutorial, we will discuss the control statements in detail with topics such as If-else, Loops, for loops, while loops, Break, and continue statements.Python Data StructuresPython comes up with several data types, including lists, tuples, sets, and dictionaries. This section will describe each data type in detail and with examples to help you understand easily.Python ListsPython TuplesPython List Vs TuplePython SetsPython DictionaryPython FunctionsThis section is going to discuss Python Functions in detail, with each topic, such as Functions, Built-in functions, Return Statement, Recursion, Lambda Functions, and Main Functions.Python ModulesThis section discusses Python Modules, which include Modules, List Comprehension, Collection Module, Math Module, OS Module, Random Module, Statistics Module, and Sys Module.Python Object-Oriented Programming (OOPs)In this section, we'll describe the principles of object-oriented programming (OOP) in Python. We will discuss topics such as Object Class, Constructors, Inheritance, Abstraction, Encapsulation, and Access Modifiers.Python Exception HandlingThis section will explore Python Exception Handling topics such as how to catch Multiple unexpected errors, raise an exception, use the Finally Keyword in Python, and Built-in Exceptions.Python File HandlingIn this section, we will elaborate on file handling topics such as Python Files I/O, Read CSV file, Write CSV File, Read Excel File, Write Excel File, Context Manager, and Python JSON.Python Advanced TopicsThis section is going to discuss some advanced Python topics in detail, such as Python Decorators, Python Generators, Python Multiprocessing, Python Multithreading, Python Network Programming, and Socket Programming using Python.Python MySQLIn this section of the tutorial, we are discussing Python MySQL in detail, with each topic, such as Python MySQL Environment Setup, Python MySQL Database Connection, and other important topics, to have a better understanding of it.Python MongoDBThis section is going to discuss Python MongoDB connectivity in detail, with each topic, such as installation, creating a file, executing a script, Mongo Shell, checking databases, checking collections and accessing records.Python SQLiteThis section will discuss Python SQLite in detail, with each topic, such as installing Python, creating a table, inserting records, and selecting records.Python Interview QuestionsAfter covering all the topics, some important questions will help you prepare for an interview.Python Programming Tutorial Overview ========== This tutorial provides an overview of Python programming, covering its syntax, database connectivity, error handling, and advanced topics such as object-oriented programming. It also introduces the reader to the basic concepts and features of the Python language and system. Top 50+ Python Interview Questions and Answers ---------- Python MCQs are a great way to test your knowledge of how much you have learned after learning all the Python concepts, including the basics and the advanced. These Python MCQs cover all the topics that we have learned in this tutorial. Online Compiler ---------- This Online Python Compiler will help you to write, compile, and execute Python programs without installing it on your local computer. This compiler runs directly in a web browser and is very useful for beginners, students, and developers who want to quickly test Python code. Prerequisite ---------- Before learning Python, you must have basic knowledge of programming concepts. Audience ---------- Our Python Programming tutorial is designed to help beginners and professionals. Problem ---------- We assure that you will not find any problem in this Python tutorial. But if there is any mistake, please post the problem in the contact form. What is Python? ---------- Python is a simple, general purpose, dynamic, high level, interactive, interpreted, and object-oriented programming language. It is one of the most popular programming languages used in many areas on most platforms. Introduction ---------- The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python web site, and may be freely distributed. Python has emerged as one of the top programming languages in the world due to its simplicity and versatility. Developed by Guido van Rossum in the late 1980s at the National Research Institute in the Netherlands, Python's first version was released in 1991. Since then, it has become a staple for creating millions of websites, apps, and games. The language's core syntax is derived from ABC, with influences from C, C++, SmallTalk, Unix-shell, Modula-3, and Algol-68. Van Rossum emphasized code readability and simplicity to enable rapid application development. Python programs are written in nearly regular English, using English keywords, concise codes, and simple syntax, making it an excellent language for beginners. Python is a great language for beginners to learn computer programming due to its simplicity and versatility. Many institutions now use Python to teach coding, as it allows students to build simple programs quickly and efficiently. Unlike other high-level programming languages like C, C++, and Java, Python's syntax is easy to understand and read, making it perfect for creating websites, apps, and games. Python offers several advantages that make it a popular choice among programmers. Firstly, it is portable, meaning that the same code can be run on different computers with various operating systems such as Windows, Macs, Linux machines, and Raspberry Pi, etc. This makes it ideal for developing cross-platform applications. Secondly, Python comes with a vast array of useful tools and pre-written code known as the Standard Library, which makes it easier to build programs quickly. Additionally, Python has excellent support materials for programmers, including well-written documentation and a powerful community that provides guidance and sample code. Thirdly, Python is free and open source, making it accessible to anyone who wants to learn programming. It also has a strong community of developers who contribute to its growth and development. This means that users can install Python on their computer and use it without any cost. Lastly, Python is a powerful language that attracts developers from around the world. It is used by numerous companies such as Google, IBM, Facebook, Microsoft, NASA, Red Hat, Verizon, Xerox, and Yahoo!. Professional game programmers also use Python as a tool to create engaging games. With Python, users can write programs that employ a GUI, process files, and use various data structures. Overall, Python is an excellent language for beginners and experienced programmers alike. Its simplicity, versatility, and powerful features make it an ideal choice for creating a wide range of applications.Python's simplicity and high-level nature make it a versatile language that can be applied to almost every technical field. Its ability to write fewer lines of code for the same task results in fewer programming errors and reduces development time. ========== We can compare Python with other languages such as C++ and Java, which require more lines of code to achieve the same result. For example, in Java, printing "Hello World" requires three lines of code. In contrast, Python requires only one statement. However, both programs produce the same output: "Hello World". The key difference lies in the syntax and structure of the code. Python is a popular high-level language that can be used in various applications such as web development, machine learning, artificial intelligence, gaming, science, and more. It has a wide range of frameworks and libraries, including Pyramid, Django, Flask, Tk, PyGTK, PyQt, and many others. Python 2 and Python 3 are two versions of the language that have some key differences. For instance, the print statement in Python 2 is different from Python 3. Additionally, raw_input() has been replaced by input(), floor division uses / instead of //, and string types have changed. Despite these changes, Python remains a popular choice among developers due to its simplicity, flexibility, and extensive range of applications.Python 3.x vs Python 2.x: Choosing the Right Version for Data Science ========== Python 3 has become the future of the programming language, while Python 2 is still widely used due to its lack of updates. However, Python 3 is more suitable for data science applications, thanks to its improved syntax and standard library content. Comparing Python 3.x and Python 2.x Due to the changes in syntax and standard library content, Python 3 is incompatible with Python 2. For a complete list of differences, refer to "What's new in Python 3.0". Choosing the Right Version for Data Science Python 3 is the preferred version for data science due to its advanced features, improved syntax, and enhanced standard library content. It offers more efficient and effective solutions for data analysis, artificial intelligence, machine learning, and other data science applications. Key Points to Consider Some key points that make Python a popular choice among developers and data scientists are: (a) Its popularity and versatility (b) The ability to learn basic Python for free (c) A supportive user community (d) Customization options through various libraries and frameworks (e) Automation capabilities using simple Python programs Conclusion In this tutorial, we have focused on the basics of Python programming language. We hope that you have gained a better understanding of why Python is a favorite among developers and data scientists. Learning Python will open up various opportunities in tech and provide a solid foundation for your career.

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