Introduction to Computing and Problem Solving with

PYTHON

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Preface

Python is a widely used general-purpose, high-level programming language. This is an Open Source Software and its source code is available with a license in which the Copyright holder provides the rights to study, change, and distribute the software to anyone and for any purpose. This can run on any hardware platform (PC, Mac, Sun Sparc, etc.) or software platform (Linux, MacOS, Unix, Windows, etc.). Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in least lines of code than in languages like C++ or Java. Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library.

Python was conceived in the late 1980s and its implementation was started in December 1989 by Guido van Rossum at Centrum Wiskunde & Informatica which is a research center in Netherlands .The non-profit organization Python Software Foundation fosters development of the Python community and is responsible for various processes within the Python community, including developing the core Python distribution, managing intellectual rights, developer conferences including PyCon, and raising funds. The softwares like YouTube, DropBox, Instagram, etc. are to name a few which is written in Python.

Python is used in many application domains. The Python Package Index lists thousands of third party modules for Python. Python's standard library and the community-contributed modules allow for endless possibilities. In Web and Internet development, Python offers many choices of Web development like Django and Pyramid for Frame work, Flask and Bottle for Micro-frameworks and advanced content management systems such as Plone & Django CMS. In addition to this, Python's standard library supports many Internet Protocols such as HTML, XML, JSON, E-mail processing, FTP, IMAP etc. Python is in education presently from post secondary and Government is utilizing this for Administration, Homeland Security, Public Safety, Traffic Control, Urban Infrastructure etc. In Business Python is using in domains such as Consumer Goods Industry, Aviation, Medical, Industrial, Financial services, GIS & Mapping, Marine and Lighting. Python is used in areas of Customer Relationship Management (CRM), Content & Document Management, Energy Conservation, E-Commerce, Enterprise Resource Planning (ERP), Knowledge Management, Manufacturing, Product Development, Project Management, Quality Control, Six Sigma, Lean, Relational Online Analytical Processing (ROLAP), Risk Management, Simulation etc. In Network Programming, Python is used to control Firmware updates, bringing desktop applications to the Internet etc. In Software, Python plays a right role in Accessibility, Code Generation, Computer Graphics, Cross-platform Development, Data Mining, Documentation Development, E-mail, Embedded Systems, Functional Testing, Groupware, Legacy System Integration, Rapid Application Development, RSS aggregator, User Interface, Visual Effects etc.

Python is widely used in areas such as Biology, Geography, Language Processing, Astrology etc. Based on the application, many packages and libraries are developed in Python. SciPy is a collection of packages for Mathematics, Science, and Engineering. Pandas is a data analysis and modeling library. IPython is a powerful interactive shell that features easy editing and recording of a work session, and supports visualizations and parallel computing.

This book will help every student, teacher and researcher to understand the computing basics and advanced Python Programming language. The simple style of presentation makes this a friend for self learners.

The first two Chapters introduce the reader on digital computers and programming. The third Chapter gives an introduction to Python which includes reserved keywords, identifiers, variables and operators. The fourth Chapter gives detailed explanation about data types and their operations. Chapter 5 illustrates flow control techniques which include decision making and looping. Functions are covered in Chapter 6. Chapter 7 explains built-in modules, user defined modules, packages, time, calendar and datetime modules. File handling is covered in Chapter 8. The entire concept of Object Oriented Programming is explained in Chapter 9. Various Exception Handling techniques are explained in Chapter 10. The Chapters 11 & 12 cover advanced topics like Python Regular Expressions and Database Programming in detail.

All Chapters have worked out programs, illustrations, review and frequently asked interview questions. More than 300 solved lab exercises available in this book is tested in Python 3.4.3 version for Windows. Please note that the syntax in early versions of Python and UNIX version of Python is slightly different from Python 3.4.3 for Windows.

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