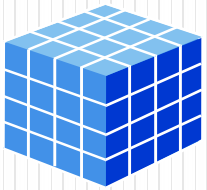
Scripting Language



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COURSE DESCRIPTION:

- As an introductory course for the B.Tech, the student will be learning a very popular scripting language 'PYTHON', which is a pre-requisite to many Programming Languages.

- The purpose of the course is to provide the Basic programming methodology and writing programs in python This course will enable one to learn programming skills necessary to implement all the basic mathematical , scientific calculations and various operations. Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language.

- The study of computer science includes the study of how information is organized, manipulated and utilized in a computer. Thus it is extremely important for a student of computer science to understand the concepts of information organization and manipulation. It is important to recognize the logical connections among the data and represent them in a logical data structure.

- This will also give the foundation needed to learn any other programming language in an easy manner. By the end of the course the student will be able to know about different types of applications like Modules, Methods,searching, Data structures, List, Dictionaries, and IDE etc.

COURSE OBJECTIVES:

- To understand the various steps in Program development.
- To understand the basic concepts in Python Programming Language.
- To learn how to write programs in interactive mode and script mode
- To get knowledge how to use operators
- To learn to write programs using conditional, loop statements etc..
- To make the student understand simple sorting and searching methods.
- To get basic knowledge on Functions, Files and Exception Handling
- To understand the advanced concepts in Python Programming Language.
- To make the student understand class, embedding database using python programming
- To make the student to develop small project using Python programming language concepts.

Programming Language

COURSE OUTCOMES:

- The students will be able to write basic programs using python. It helps to improve logical and analytical skill set. It makes them easy and simple to learn high level programming skills.

- The students will be able to write advanced programs using python OOP, Networking and Web programming. It helps to develop industry oriented, web based and gaming applications.

COURSE PREREQUISITES:

- Logic & Reasoning [Mathematical Skills]
- Understanding Basic Computer Programming Terminologies
- Exposure to WINDOWS, UNIX / LINUX Environments

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Programming Language

- **UNIT – I [12 Lectures]**
- **Introduction to Python Programming:** Features of Python, History of Python, Downloading and Installing Python, Writing and Executing First Python Program
- **Python Basics:** Literal Constants, Variables and Identifiers, Data Types, Input/Output Operations, Comments, Reserved Words, Indentation
- **Operators and Expressions:** Arithmetic, Comparison, Assignment, Relational, Unary, Bitwise, Shift, Logical, Membership, Identity, Operator Precedence and Associativity, Expressions
- **Decision Control Statements:** Selection/Conditional Branching Statements – if, if-else, Nested if, if- elif-else statements
- **Basic Loop Structures/Iterative Statements:** while, for, Nested loops, continue, break, pass statements
- **Assignments Programs and Case Study 1**

Introduction to Python Programming:

Features of Python

History of Python

Downloading and Installing Python

Writing and Executing First Python Program

Features of Python

–Beginners Language

-Simple & Easy to Learn

-- Free and Open Source

-- Multi Purpose [Web,GUI, Scripting etc..]

--High Level

-- Embedded

–Extensive Standard Library

–Cross Platform Compatibility

–Interactive Mode

-Interpreted

-- Object Oriented

–Portable, Extendable

–Databases and GUI Programming

–Scalable and Dynamic in nature

–Automatic Garbage Collection

Features of Python

1. Simple

- Reading a good Python program feels almost like reading English (Very strict English).
- This pseudo-code nature of Python is one of its greatest strengths. It allows you to concentrate on the solution to the problem rather than the language itself.

2. Easy to Learn

- Python is extremely easy to learn because Python has an extraordinarily simple syntax.
- Elegant syntax, making the programs you write easier to read.

3. Free and Open Source

- Python is an example of a FLOSS (Free/LibrÃ© and Open Source Software).
- In simple terms, you can freely distribute copies of this software, read it's source code, make changes to it, use pieces of it in new free programs, and that you know you can do these things. This is one of the reasons why Python is so good.

Features of Python

4. High-level Language

- When you write programs in Python, you never need to bother about the low-level details such as managing the memory used by your program, etc.

5. Portable

- Due to its open-source nature, Python has been ported (i.e. changed to make it work on) to many platforms. All your Python programs can work on any of these platforms without requiring any changes at all.
- You can use Python on Linux, Windows, FreeBSD, Macintosh, Solaris, OS/2, Amiga, AROS, AS/400, BeOS, OS/390, z/OS, Palm OS, QNX, VMS, Psion, Acorn RISC OS, VxWorks, PlayStation, Sharp Zaurus, Windows CE and even PocketPC !

Features of Python

6. Interpreted

- A program written in a compiled language like C or C++ is converted from the source language i.e. C or C++ into a language that is spoken by your computer (binary code i.e. 0s and 1s) using a compiler with various flags and options. When you run the program, the linker/loader software copies the program from hard disk to memory and starts running it.
- Python, on the other hand, does not need compilation to binary. You just *run* the program directly from the source code. Internally, Python converts the source code into an intermediate form called bytecodes and then translates this into the native language of your computer and then runs it.
- All this, actually, makes using Python much easier since you don't have to worry about compiling the program, making sure that the proper libraries are linked and loaded, etc, etc. This also makes your Python programs much more portable, since you can just copy your Python program onto another computer and it just works.

Features of Python

7. Procedure Oriented and Object Oriented

- Python supports procedure-oriented programming as well as object-oriented programming. In *procedure-oriented* languages, the program is built around procedures or functions which are nothing but reusable pieces of programs. In *object-oriented* languages, the program is built around objects which combine data and functionality. Python has a very powerful but simplistic way of doing OOP, especially when compared to big languages like C++ or Java.

8. Extensible

- If you need a critical piece of code to run very fast or want to have some piece of algorithm not to be open, you can code that part of your program in C or C++ and then use them from your Python program.

9. Embeddable

- You can embed Python within your C/C++ programs to give 'scripting' capabilities for your program's users.

Features of Python

10. Extensive Libraries

- The Python Standard Library is huge indeed. It can help you do various things involving regular expressions, documentation generation, unit testing, threading, databases, web browsers, CGI, ftp, email, XML, XML-RPC, HTML, WAV files, cryptography, GUI (graphical user interfaces), Tk, and other system-dependent stuff. Remember, all this is always available wherever Python is installed. This is called the 'Batteries Included' philosophy of Python.

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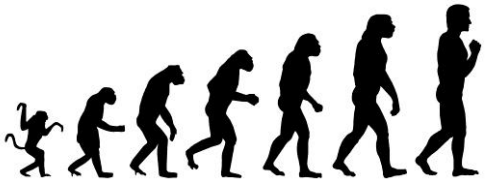
History of Python



Python was created in the early 1990s by Guido van Rossum at CWI(Centrum Wiskunde & Informatica) in the Netherlands. CWI is the national research institute for mathematics and computer science.

Python language is named after the television show Monty Python's Flying Circus and many examples and tutorial include jokes from the show

Derives its features from many languages likeJava, C++, ABC, C, Modula3, Smalltalk, Algol-68, Unix shell and other scripting languages.

Available under the GNU General Public License (GPL) – Free and open-source software's

Major implementations of Python are Cpython, IronPython, Jpython,MicroPython,PyPy

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History of Python

- Python is currently one of the most popular dynamic programming language.
- Python is often viewed as Scripting language but Python is really a general purpose language along the lines of Lips or smalltalk.
- Python is used for everything from throw-away scripts to large scalable web servers that provide uninterrupted service 24x7.
- Python is used for GUI and database programming, client and server side web programming, application testing, data analytics and scientific application development.

Introduction to Python Programming

•Python is a widely used high-level programming language for general-purpose programming, created by Guido van Rossum.

•python first version is 1.0 and latest version is 3.6

•Python interpreters are available for many operating systems, allowing Python code to run on a wide variety of systems.

•Python uses whitespace indentation to delimit blocks rather than curly braces or keywords. An increase in indentation comes after certain statements.

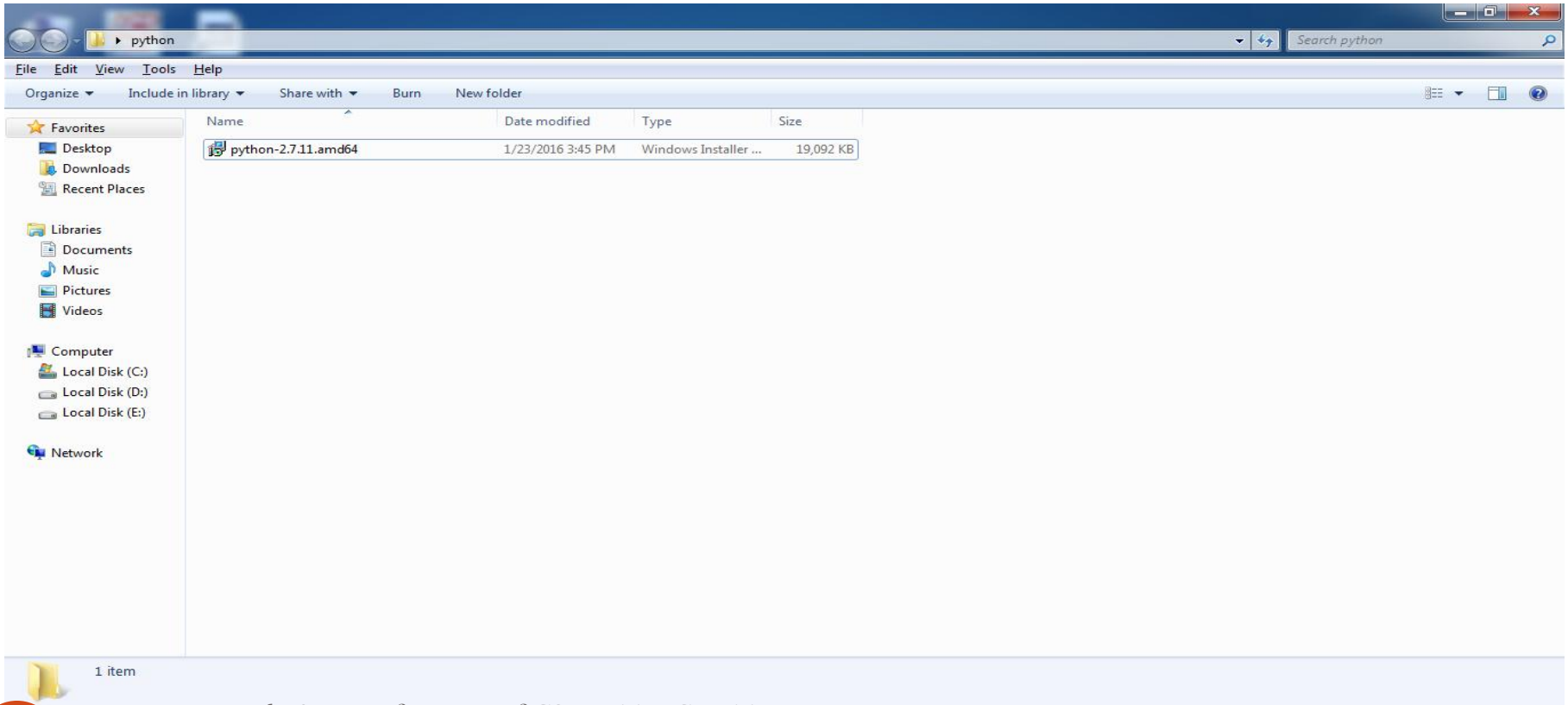
•Python file extension is .py

python

Programming Language

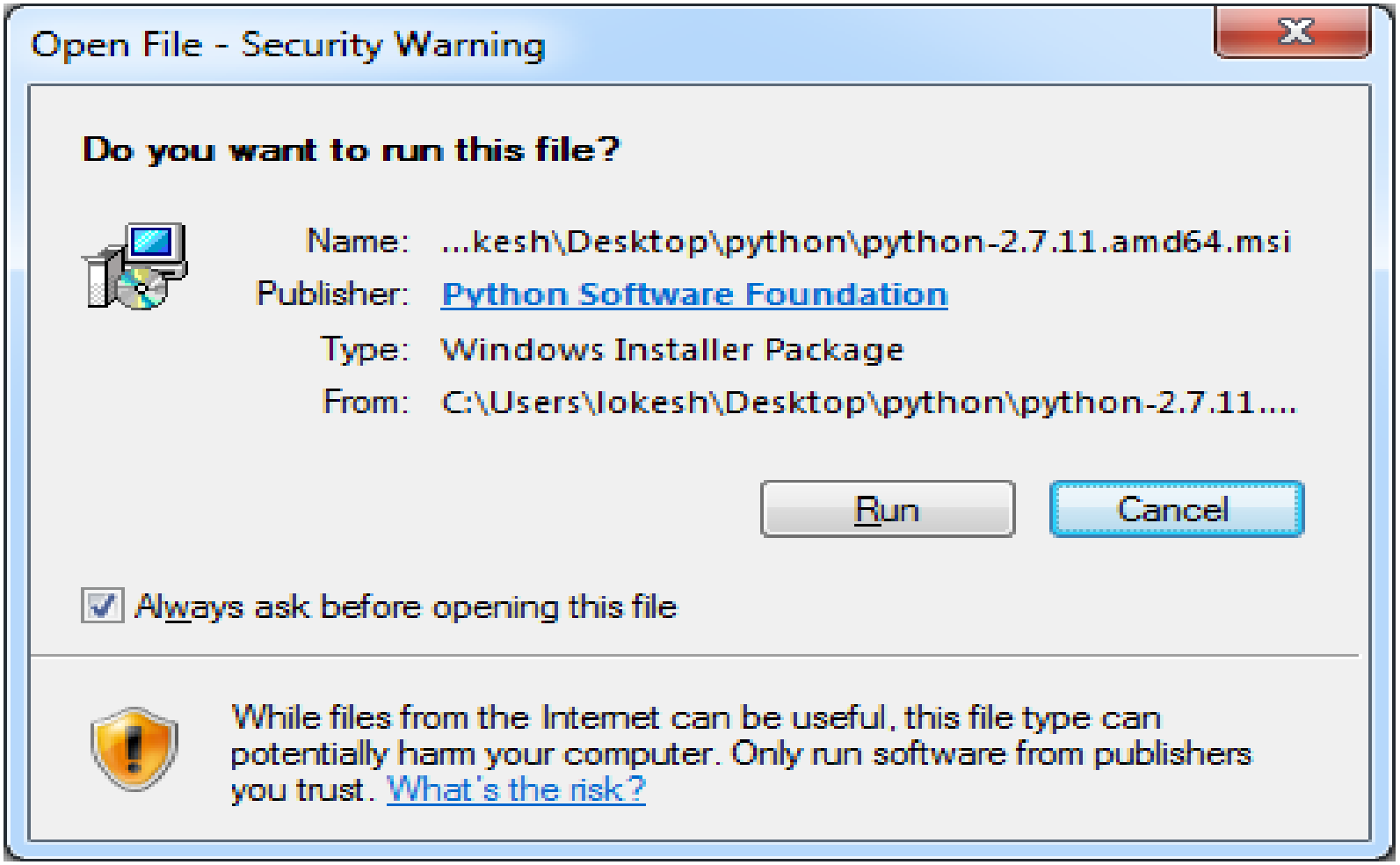
Downloading and Installing Python

- Download python from https://www.python.org/downloads website wich is suitable for your machine.



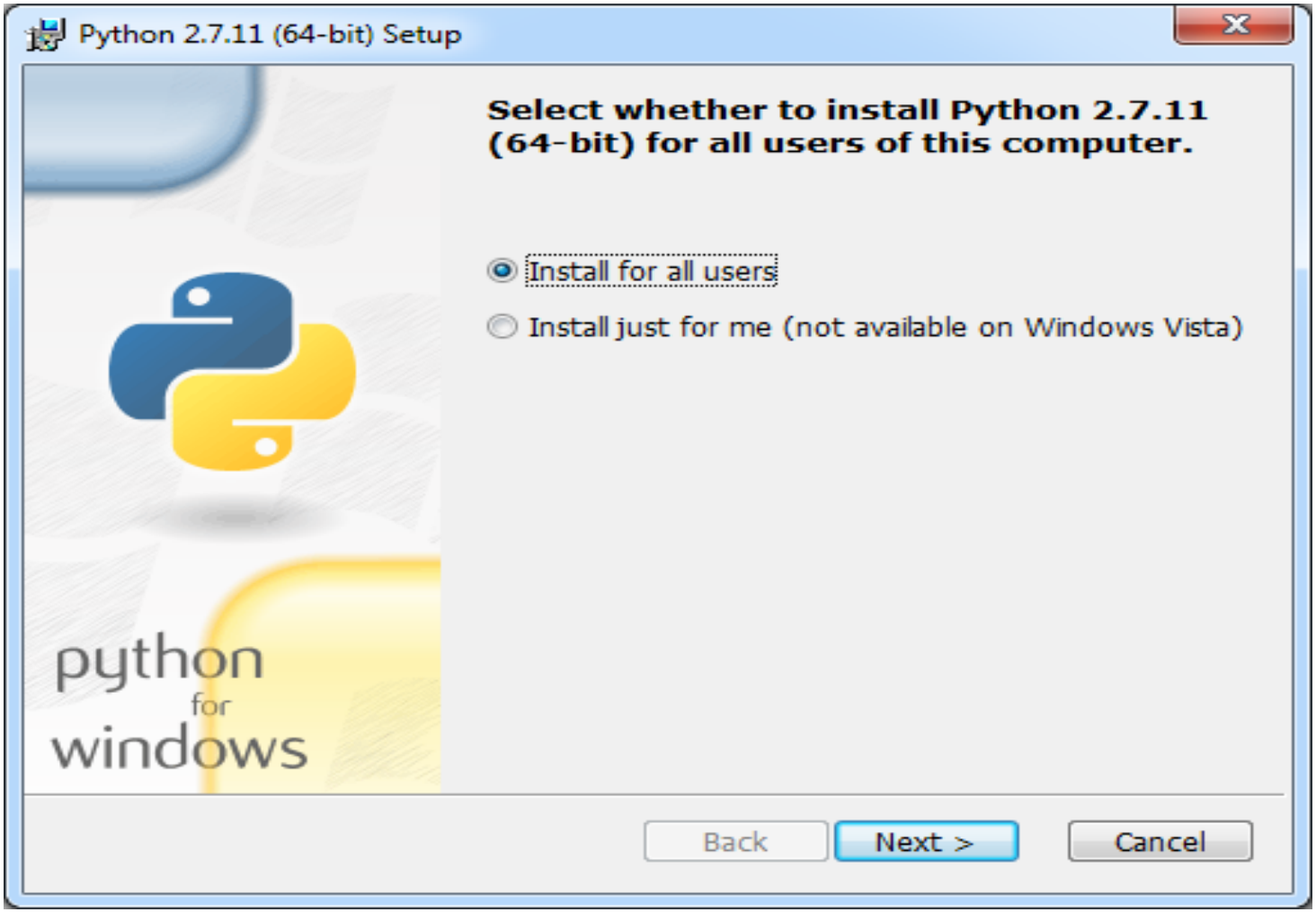
Click on installer

Downloading and Installing Python



Click in run button

Downloading and Installing Python



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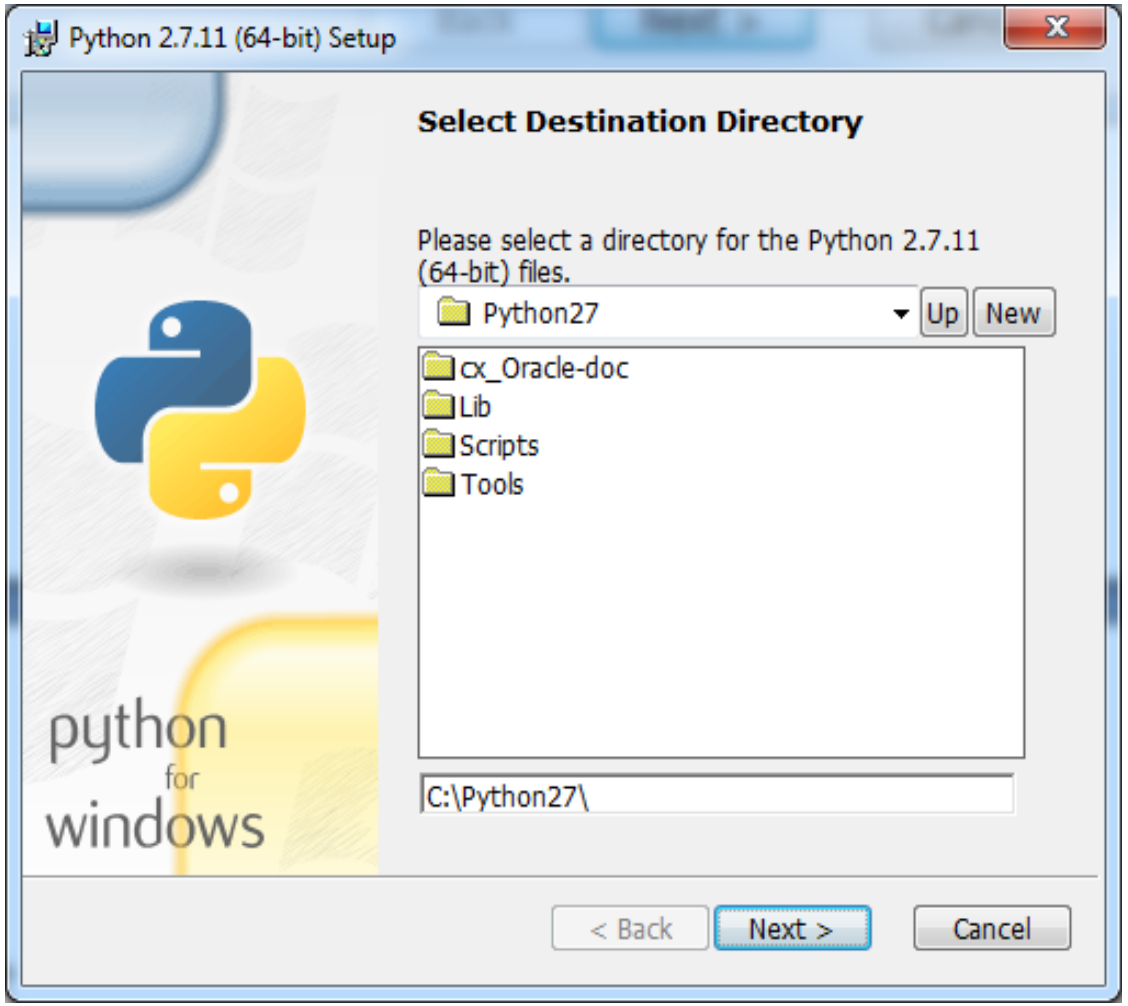
Downloading and Installing Python

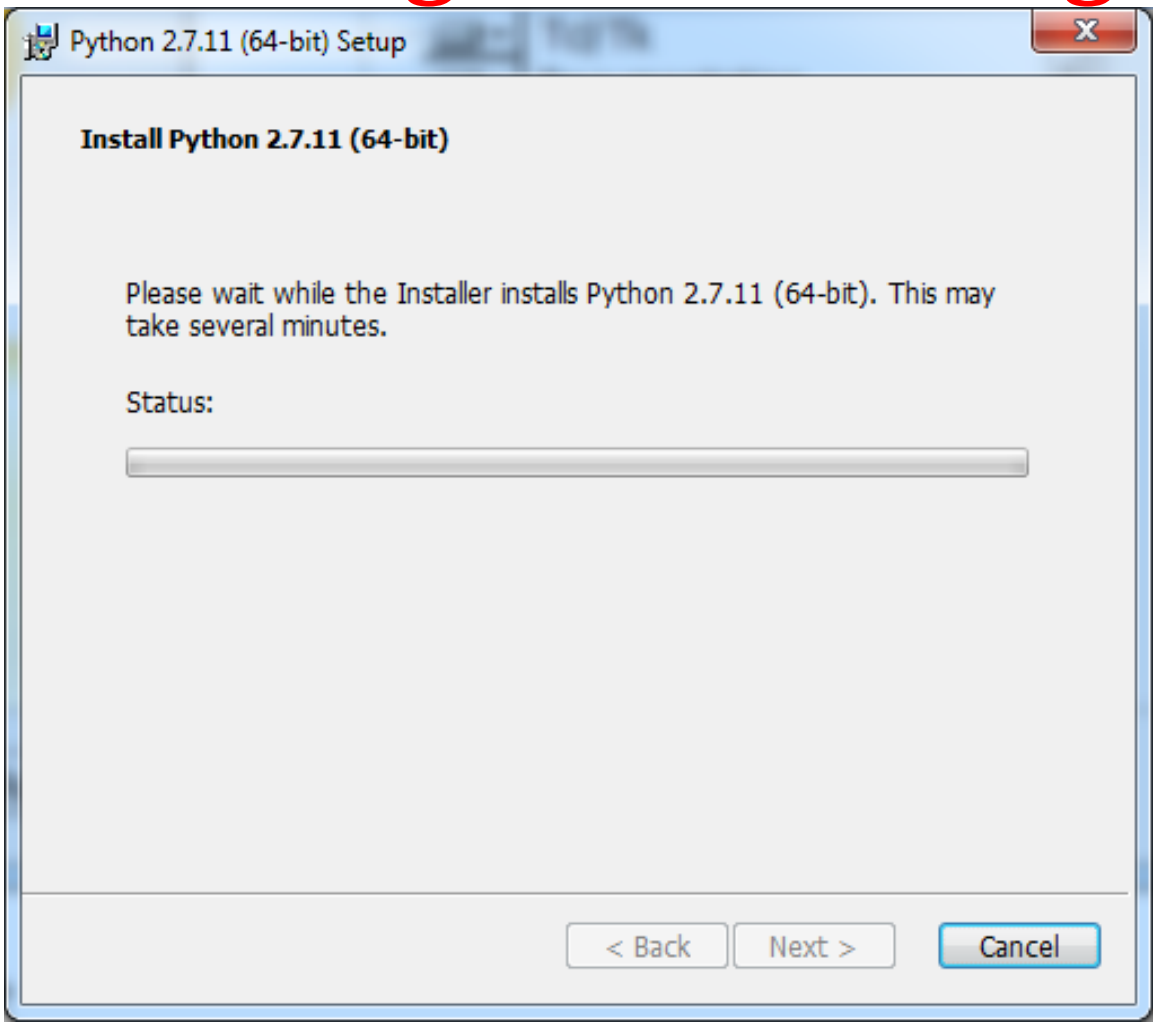


Click on next

Downloading and Installing Python

Click on next

Downloading and Installing Python



Click on yes

Downloading and Installing Python

Click on finish

Python Programming Language

Why Python …?

Python is a popular programming language used for both standalone programs and scripting applications in a wide variety of domains. It is free, portable, powerful, and remarkably easy to use.

GOAL…!

Goal is to bring you quickly up to speed on the fundamentals of the Core Python Programming Language

Roughly 1 million Python users are out in the Industry market

The choice of *DEVELOPMENT TOOLS* is sometimes based on unique constraints or personal preference

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Python Versions

• **Python v0.9.0 - February, 1991**

–Features: Exception Handling, Functions and core data types like List, Dictionary, String and others. It was object oriented and had module system

•**Python v1.0 - January 1994**

–Features: Functional Programming tools lambda, map, filter and reduce

•**Python v2.0 - October 2000**

–Features: List comprehensions, Garbage Collector and support for Unicode.

•**Python v3.0 - 2008**

–Known as "Python 3000" and "Py3k". It is not backward compatible with v2.0 and its other variants. Emphasizes more on removal of duplicate programming constructs and modules

•**Python v3.5 – 2016**

–Presently lets work with Python 3.5 …

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Applications of Python

- 1. GUI-based desktop applications
- 2. Web frameworks and applications
- 3. Enterprise and business applications
- 4. Operating Systems
- 5. Language Development
- 6. Prototyping
- 7. Data Science & Analysis

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Applications of Python

• **Embedded scripting language:** Python is used as an embedded scripting language for various testing/ building/ deployment/ monitoring frameworks, scientific apps, and quick scripts.

• **3D Software:** 3D software like Maya uses Python for automating small user tasks, or for doing more complex integration such as talking to databases and asset management systems.

• **Web development:** Python is an easily extensible language that provides good integration with database and other web standards.

•**GUI-based desktop applications:** Simple syntax, modular architecture, rich text processing tools and the ability to work on multiple operating systems makes Python a preferred choice for developing desktop-based applications.

Applications of Python

•**Image processing and graphic design applications***:* Python is used to make 2D imaging software such as Inkscape, GIMP, Paint Shop Pro and Scribus. It is also used to make 3D animation packages, like Blender, 3ds Max, Cinema 4D, Houdini, Lightwave and Maya.

•***Scientific and computational applications:*** Features like high speed, productivity and availability of tools, such as Scientific Python and Numeric Python, have made Python a preferred language to perform computation and processing of scientific data.

•**Games:** It various modules, libraries, and platforms that support development of games. Games like Civilization-IV, Disney's Toontown Online, Vega Strike, etc. are coded using Python.

• **Enterprise and business applications:** Simple and reliable syntax, modules and libraries, extensibility, scalability together make Python a suitable coding language for customizing larger applications. For example, Reddit which was originally written in Common Lips, was rewritten in Python in 2005. A large part of Youtube code is also written in Python.

• **Operating Systems:** Python forms an integral part of Linux distributions

Worldwide Python Users

Web Development

–Yahoo Groups, Google, Shopzilla

Games

–Battelefield2, The Temple of Elemental Evil, Vampire

Graphics

–Walt Disney feature Animation, Blender 3D

Science

–National Weather Service

–NASA

–Environmental Systems Research Institutes

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Why?

Who uses Python ?:

- Google
- NASA
- Yahoo
- Youtube
- Linux (RedHat, Ubuntu, ...)
- Lots of researchers
- EVE online (Thousands of online players)
- MIT (Programming Intro. Course)
- etc...

Watch this Google I/O video clip, Wesley Chun listing the uses of python and what companies use Python. (from 22:35 to 29:10)

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Python Users:

.Google makes extensive use of Python in its web search system, and employs Python's creator.

• The YouTube video sharing service is largely written in Python.

• The popular BitTorrent peer-to-peer file sharing system is a Python program.

• Intel, Cisco, Hewlett-Packard, Seagate, Qualcomm, and IBM use Python for hardware testing.

• Industrial Light & Magic, Pixar, and others use Python in the production of movie animation.

• JPMorgan Chase, UBS, Getco, and Citadel apply Python for financial market forecasting.

• NASA, Los Alamos, Fermilab, JPL, and others use Python for scientific programming tasks.

• iRobot uses Python to develop commercial robotic vacuum cleaners.

• ESRI uses Python as an end-user customization tool for its popular GIS mapping products.

• The NSA uses Python for cryptography and intelligence analysis.

• The IronPort email server product uses more than 1 million lines of Python code to do its job.

• The One Laptop Per Child (OLPC) project builds its user interface and activity model in Python.

Writing and Executing First Python Program

Step 1: Open an editor.

Step 2: Write the instructions

Step 3: Save it as a file with the filename having the extension .py.

Step 4: Run the interpreter with the command python program_name.py or use IDLE to run the programs.

To execute the program at the *command prompt*, simply change your working directory to C:\Python34 (or move to the directory where you have saved Python) then type python program_name.py.

If you want to execute the program in Python shell, then just press F5 key or click on Run Menu and then select Run Module.

Python is simple

```
print "Hello World!"
```
← Python

```
#include <iostream.h>
int main()
{
cout << "Hello World!";
}
```
← C++

```
public class helloWorld
{
    public static void main(String [] args)
    {
    System.out.println("Hello World!");
    }
}
```
← Java

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Write a Program to Display a Message on the Screen

```
>>> print("Hello All,Welcome to the World of Python Programming")
```

Press F5 for Execeution

Output: Hello All,Welcome to the World of Python Programming

Write a Program to justify thaat Programming with Python is quite simple and easy

```
a=10
b=20
c=a+b
print(c)
```

Result: 30

Write a Program to justify that Python is a Interpreted Programming Language

```
a=10
print(a)
b=0
c=a/b
print(c)
```

```
>>>
10
Traceback (most recent call last):
  File "C:\Users\Administrator\Desktop\interpreted.py"
    c=a/b
ZeroDivisionError: division by zero
>>>
```

Programming Development Lifecycle

The program development life cycle is a set of steps or phases that are used to develop a program in any programming language.

Generally, program development life cycle contains 6 phases, they are as follows….

Problem Definition
Problem Analysis
Algorithm Development
Coding & Documentation
Testing & Debugging
Maintenance

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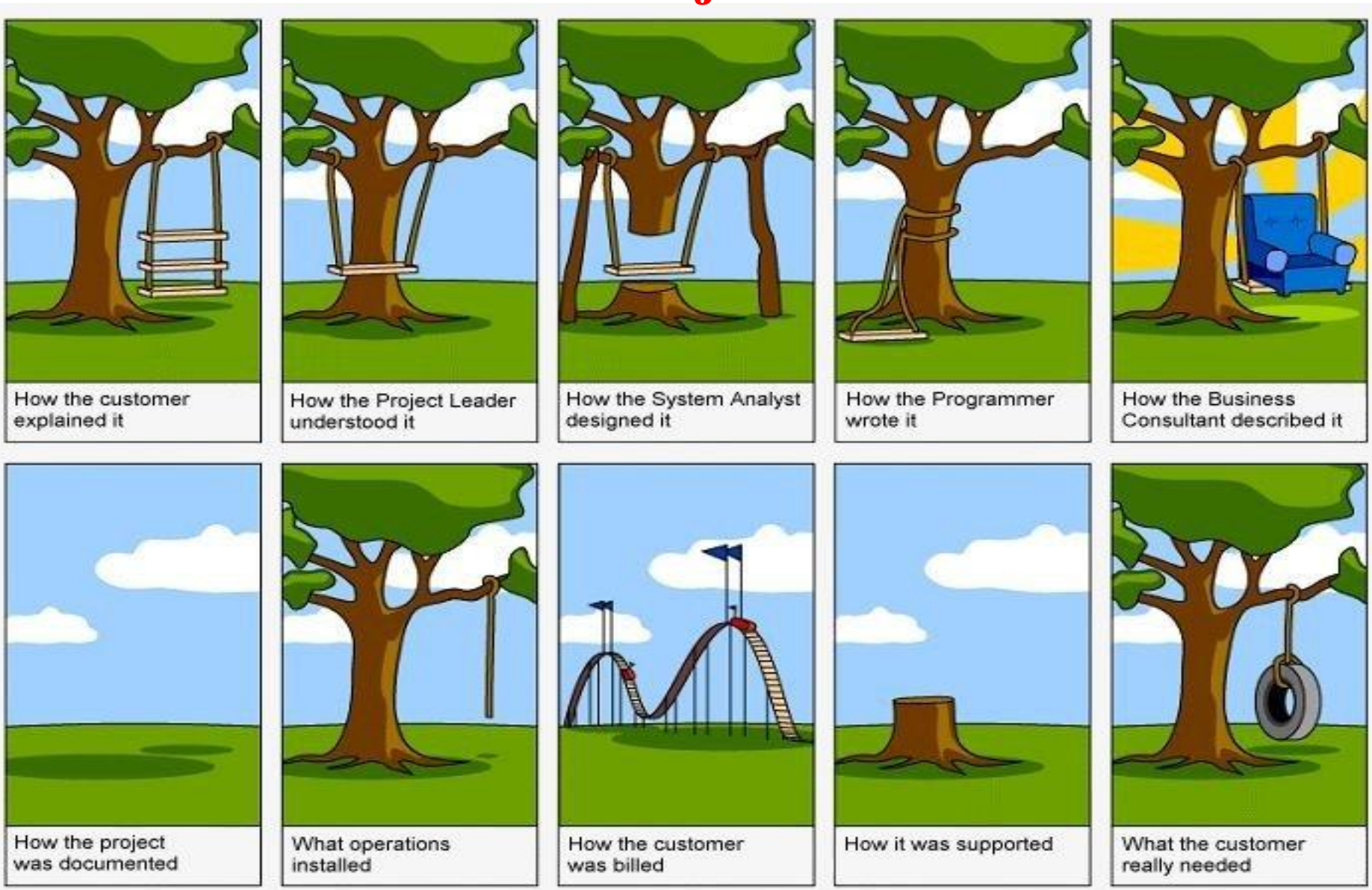
A Real Time Project Scenario…



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