



python

Top Companies using Python



NETFLIX



YAHOO!

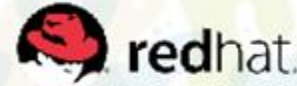
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9GAG

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Technology

Bank of America



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PANDORA



Syllabus

Module		Detailed Content	Hours
1		Python basics	5
	1.1	Data types in python, Operators in python, Input and Output, Control statement, Arrays in python, String and Character in python, Functions, List and Tuples, Dictionaries Exception, Introduction to OOP, Classes, Objects, Interfaces, Inheritance	
2		Advanced Python	4
	2.1	Files in Python, Directories, Building Modules, Packages, Text Processing, Regular expression in python.	
3		Data Structure in Python	3
	3.1	Link List, Stack, Queues, Dequeueues	

Syllabus (1)

4		Python Integration Primer	4
	4.1	Graphical User interface, Networking in Python, Python database connectivity, Introduction to Django	
5		Multithreading	4
	5.1	Thread and Process, Starting a thread, Threading module, Synchronizing threads, Multithreaded Priority Queue	
6		NumPy and Pandas	6
	6.1	Creating NumPy arrays, Indexing and slicing in NumPy, creating multidimensional arrays, NumPy Data types, Array Attribute, Indexing and Slicing, Creating array views copies, Manipulating array shapes I/O	
	6.2	Basics of Pandas, Using multilevel series, Series and Data Frames, Grouping, aggregating, Merge DataFrames	

Study Material

Textbooks:

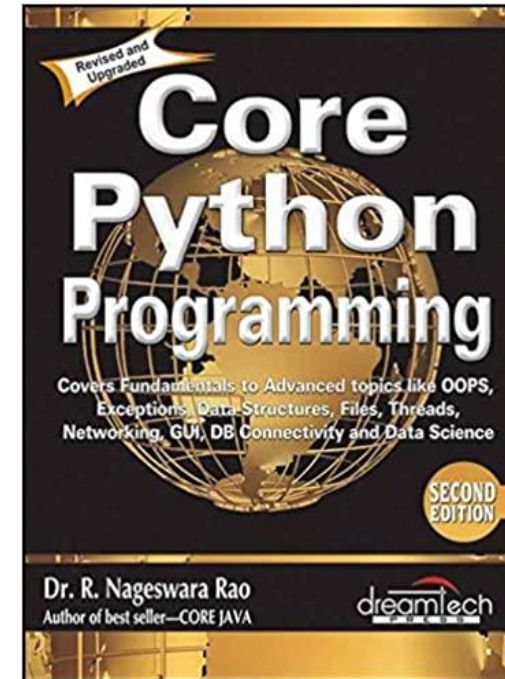
1	Dr. R. Nageswara Rao, “Core Python Programming”, DreamtechPress
2	Beginning Python: Using Python 2.6 and Python 3.1. James Payne, Wrox Publication
3	Anurag Gupta,G. P. Biswas, “Python Programming”,McGraw-Hill
4	E Balagurusamy, “Introduction to computing and problem-solving using python”,McGrawHill Education

References:

1	Learn Python the Hard Way, 3 rd Edition, Zed Shaw's Hard WaySeries
2	Laura Cassell,Alan Gauld, “Python Projects”, Wrox Publication

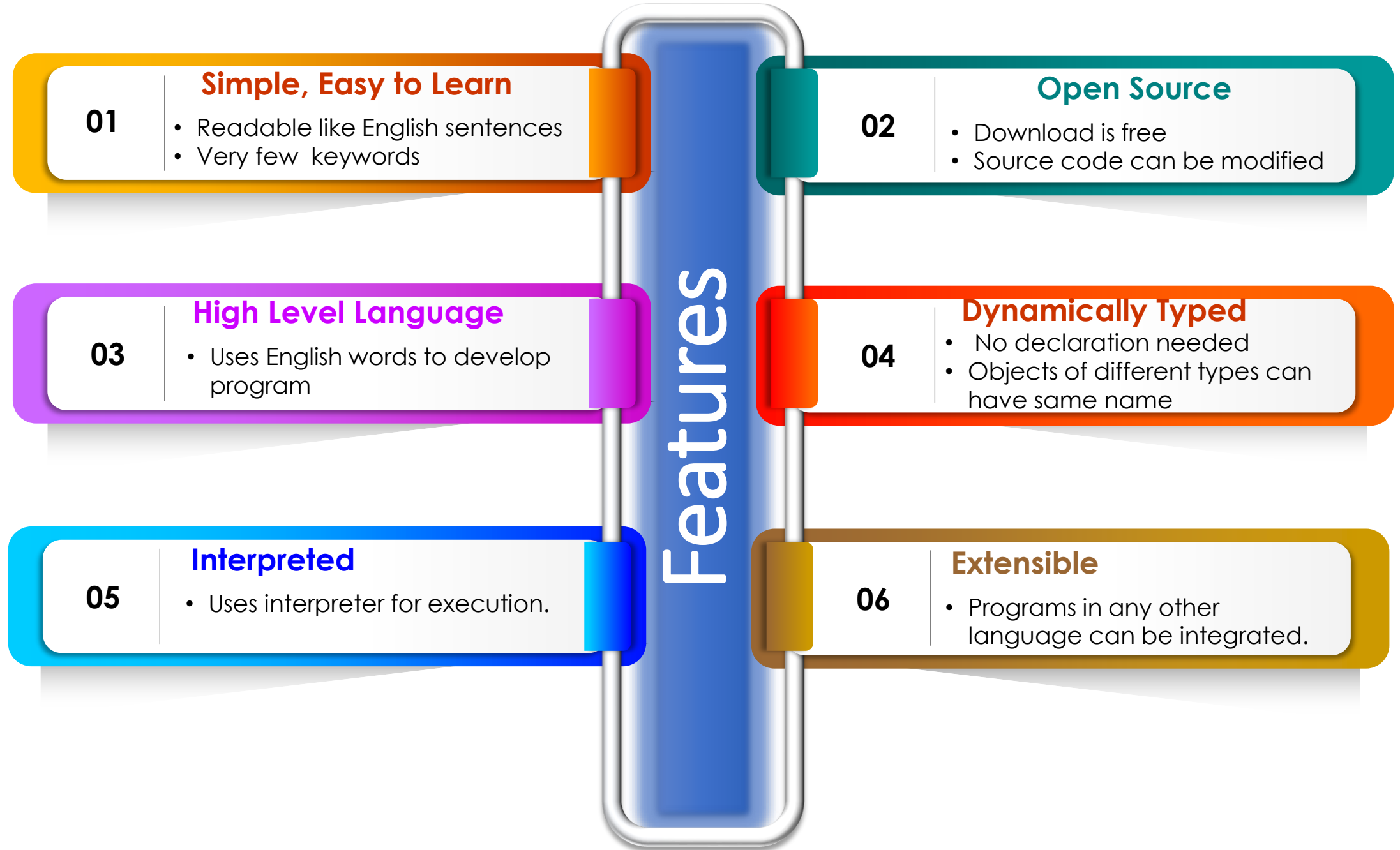
Digital material:

1	"The Python Tutorial", http://docs.python.org/release/3.0.1/tutorial/
2	Beginning Perl, https://www.perl.org/books/beginning-perl/
3	http://spoken-tutorial.org
4	https://starcertification.org/Certifications/Certificate/python



Python

- Python is a **general-purpose** interpreted, interactive, object-oriented, and high-level programming language.
- It was created by **Guido van Rossum** during 1985- 1990 and first version was released in 1991.
- It was named after a TV show Monty Python's Flying Circus.
- Python source code is also available under the **GNU General Public License (GPL)**.
 - Can be freely downloaded and modified as per the requirement.



Features (1)

07

Platform Independent

- Byte code
- PVM

08

Procedure and Object Oriented

- C + Java style

09

Embeddable

- Programs written in python can be inserted in C or C++ program

10

Huge Library

- Application specific large libraries

11

Scripting Language

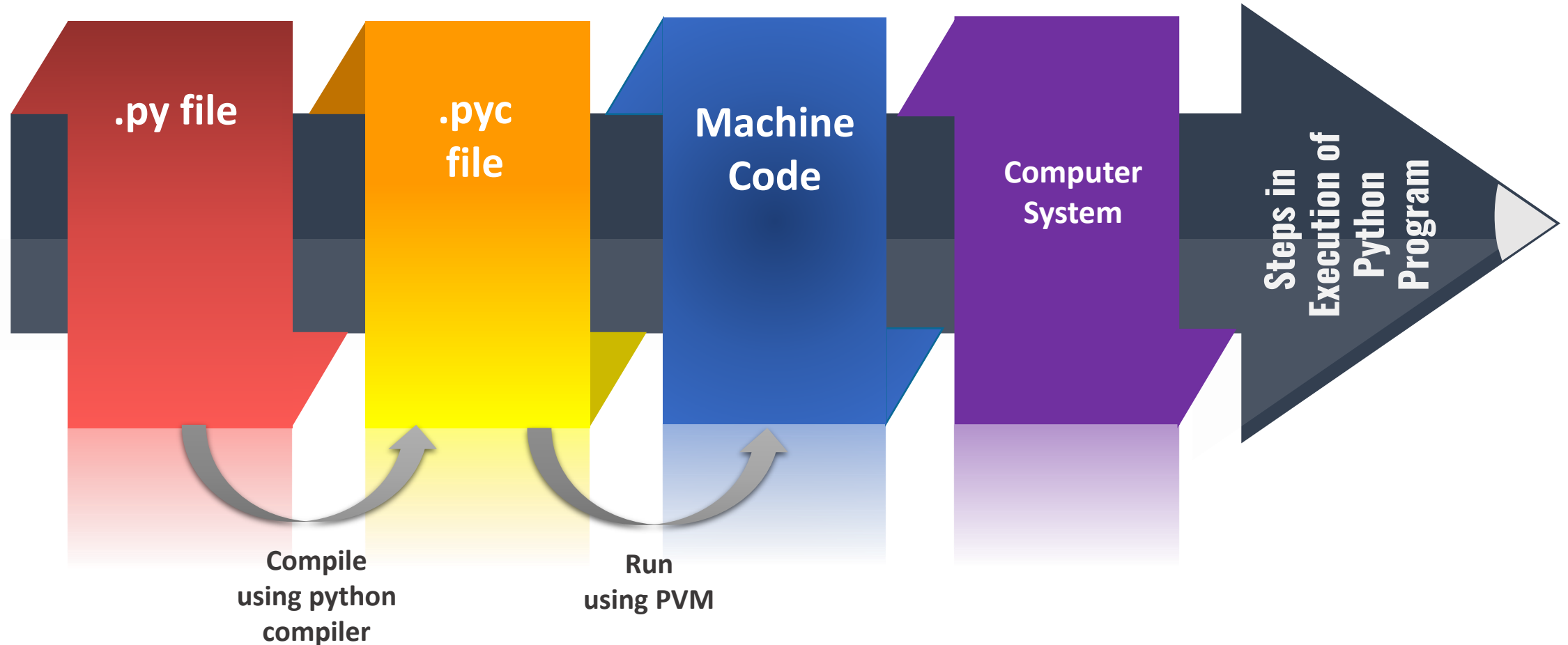
- Translate source code into machine code on the fly

12


Database Connectivity

- Interfaces to connect to all major databases.

Execution of Python Program



Viewing the Byte code

 p1.py - C:/Users/ADMIN/AppData
File Edit Format Run Options
a = b = 20;
print (a+b);
|

```
C:\Users\ADMIN>cd C:\Users\ADMIN\AppData\Local\Programs\Python\Python39\programs
C:\Users\ADMIN\AppData\Local\Programs\Python\Python39\programs>python -m dis p1.py
1          0 LOAD_CONST           0 (20)
          2 DUP_TOP
          4 STORE_NAME               0 (a)
          6 STORE_NAME               1 (b)

2          8 LOAD_NAME              2 (print)
         10 LOAD_NAME              0 (a)
         12 LOAD_NAME              1 (b)
         14 BINARY_ADD
         16 CALL_FUNCTION           1
         18 POP_TOP
         20 LOAD_CONST           1 (None)
         22 RETURN_VALUE
```

```
C:\Users\ADMIN\AppData\Local\Programs\Python\Python39\programs>python p1.py
40
```

Memory Management in Python

- Memory allocation and de-allocation are done during runtime automatically.
- Everything in python is object
- Memory manager inside PVM allocates memory for each object.
- Objects are stored in heap (runtime memory).

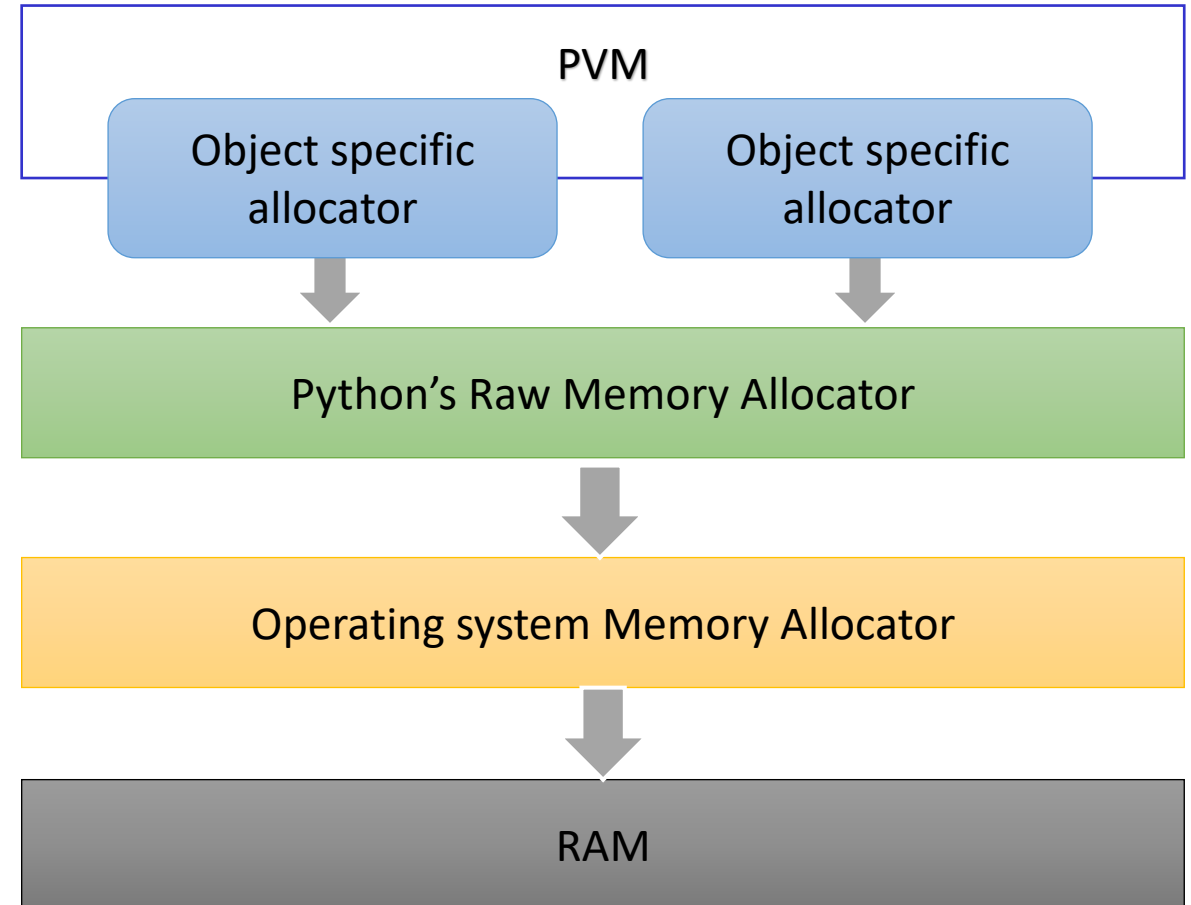


Fig. Allocation of memory by PVM

Garbage Collection in Python

- `gc` module is useful in deleting objects from the memory, which are not in used in program.
- It maintains object count regarding how many times object is referenced.
- Object is deleted when reference count is zero.

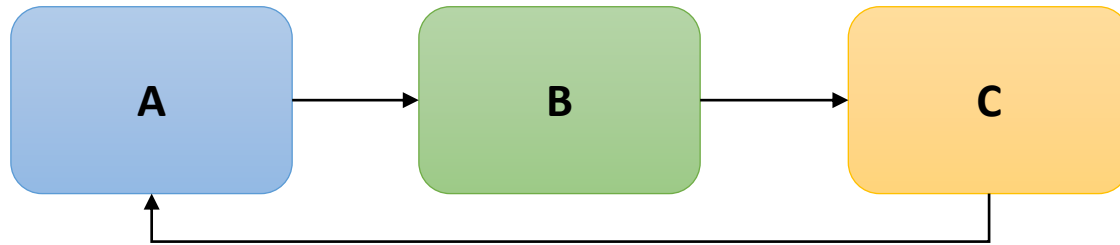


Fig. A reference cycle of three objects

- gc classifies objects in 3 generations
 - Generation 0, Generation 1, Generation 2.
- gc tries to delete younger objects which are not referenced rather than the older one

Garbage Collection in Python

- `gc` runs automatically at specific threshold, which represents frequency of how many times garbage collector removes the object.
 - When `no. of allocation - no. of de-allocation` is greater than threshold, then it runs automatically.
 - Threshold number can be viewed using `get_threshold()` method.
- If system runs out of memory, then automatic garbage collector will not run.
 - Python program will throw runtime error
 - To manually call garbage collector, `collect()` method of `gc` module can be used.

C vs Python

C

1. C is a general-purpose, procedural computer programming language.
2. Compiled programs execute faster as compared to interpreted programs.
3. Program syntax is harder than Python.
4. The type of a variable must be declared when it is created

Python

1. Python is an interpreted, high-level, general-purpose programming language.
2. Interpreted programs execute slower as compared to compiled programs.
3. It is easier to write a code in Python as the number of lines is less comparatively.
4. Variables are un-typed in Python.

C vs Python

C

- 5. The syntax of a C program is harder than Python.
- 6. The Programmer has to do memory management on their own.
- 7. C is generally used for hardware related applications.
- 8. Pointers are available in C.

Python

- 5. Syntax of Python programs is easy to learn, write and read.
- 6. Python uses an automatic garbage collector for memory management.
- 7. Python is a General-Purpose programming language.
- 8. No pointers functionality available in Python.

Java vs Python

Java

1. Java is a object oriented programming language.
2. Requires more lines of code than python
3. Program syntax is harder than Python.
4. The type of a variable must be declared when it is created

Python

1. Python blends functional programming with object oriented features.
2. It is easier to write a code in Python as the number of lines is less comparatively.
3. It is easier to write a code in Python as the number of lines is less comparatively.
4. Variables are un-typed in Python.

Java vs Python

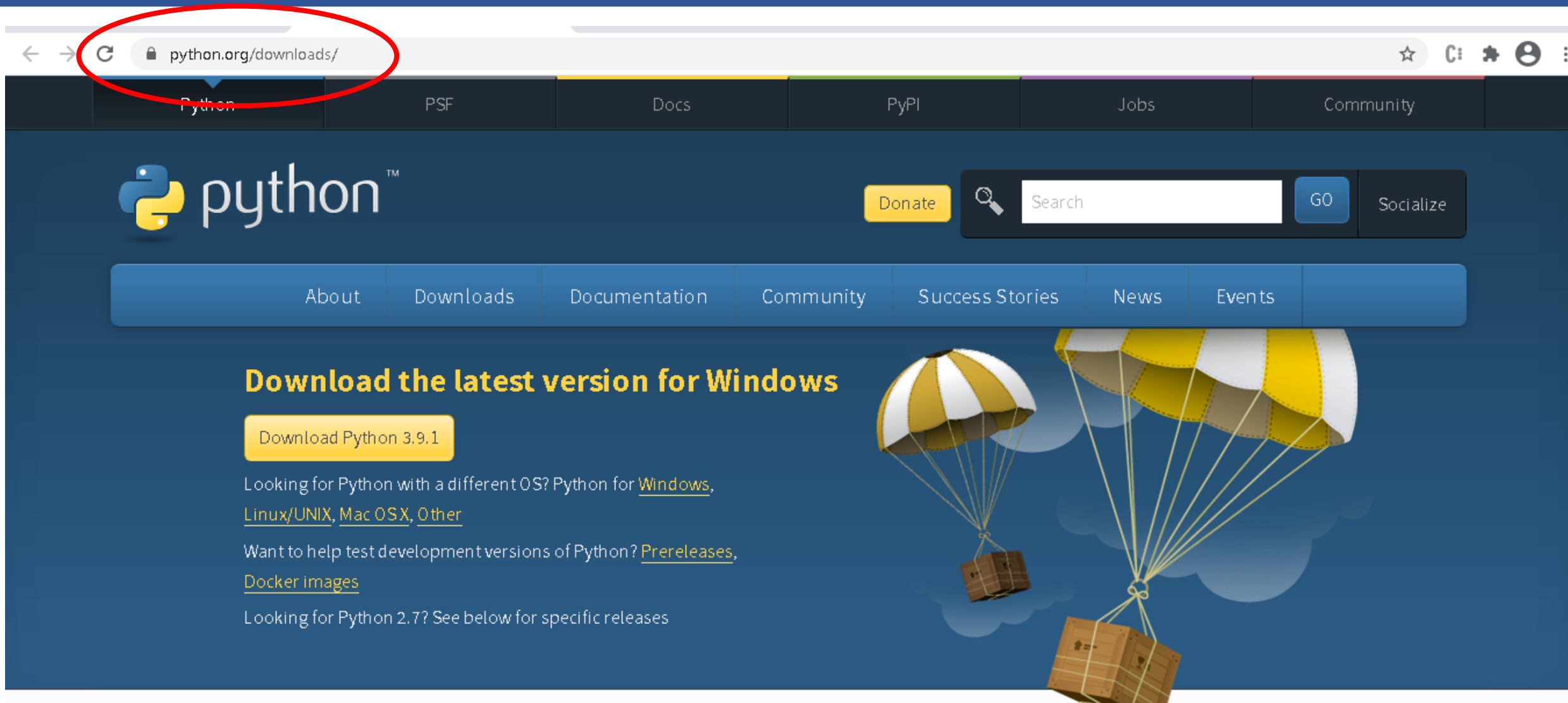
Java

- 5. The syntax of a java program is harder than Python.
- 6. Memory allocation and de-allocation is done by JVM
- 7. Indentation of statements is not necessary in java
- 8. Array indexing is positive

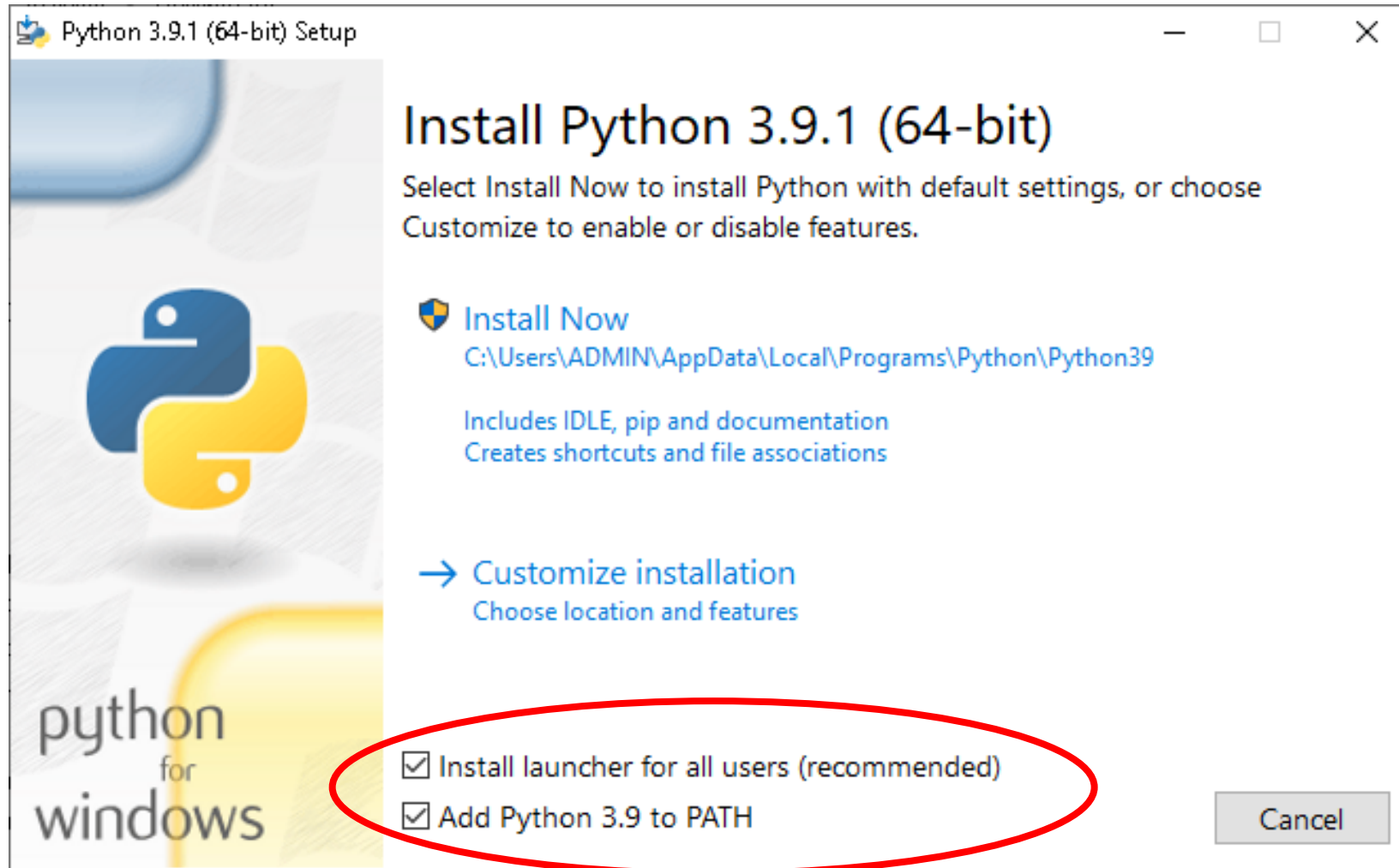
Python

- 5. Syntax of Python programs is easy to learn, write and read.
- 6. Memory allocation and de-allocation is done by PVM
- 7. Indentation is required to represent a block of statements
- 8. Array indexing can be positive or negative.

Downloading Python



Installation of Python in Windows

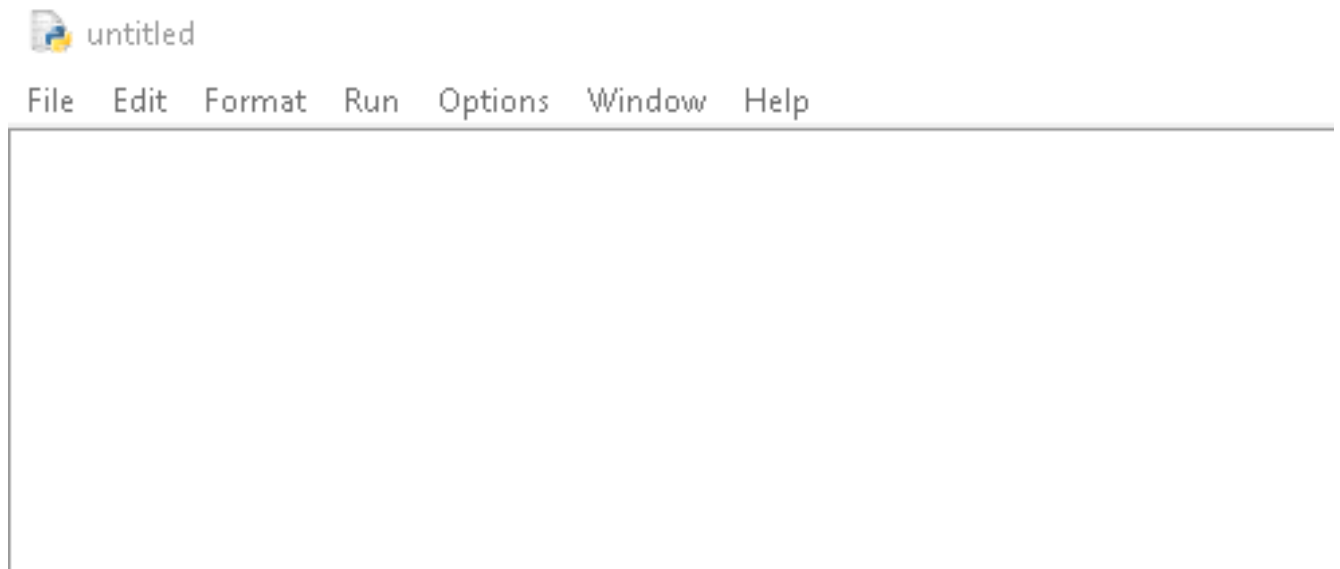
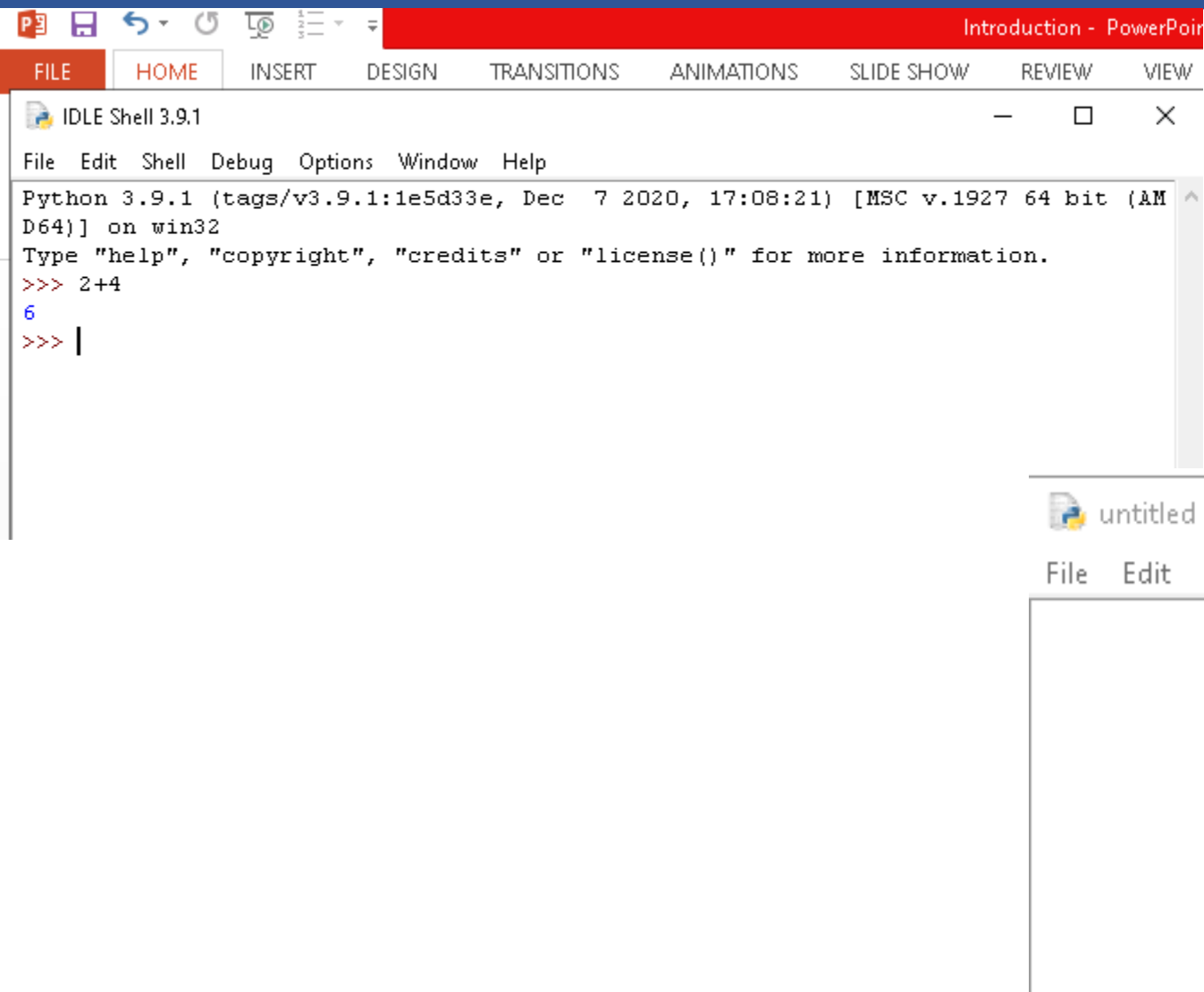


Checking Installation of Python

```
C:\Users\ADMIN>python
```

```
Python 3.9.1 (tags/v3.9.1:1e5d33e, Dec 7 2020, 17:08:21) [MSC v.1927 64 bit (AMD64)] on win32  
Type "help", "copyright", "credits" or "license" for more information.  
>>>
```


Python IDLE



Python Jupyter Notebook Installation

```
C:\Users\ADMIN>python -m pip install --upgrade pip
Collecting pip
  Downloading pip-21.0-py3-none-any.whl (1.5 MB)
    |████████████████████| 1.5 MB 3.2 MB/s
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 20.2.3
    Uninstalling pip-20.2.3:
      Successfully uninstalled pip-20.2.3
```

```
Microsoft Windows [Version 10.0.19041.746]
(c) 2020 Microsoft Corporation. All rights reserved.

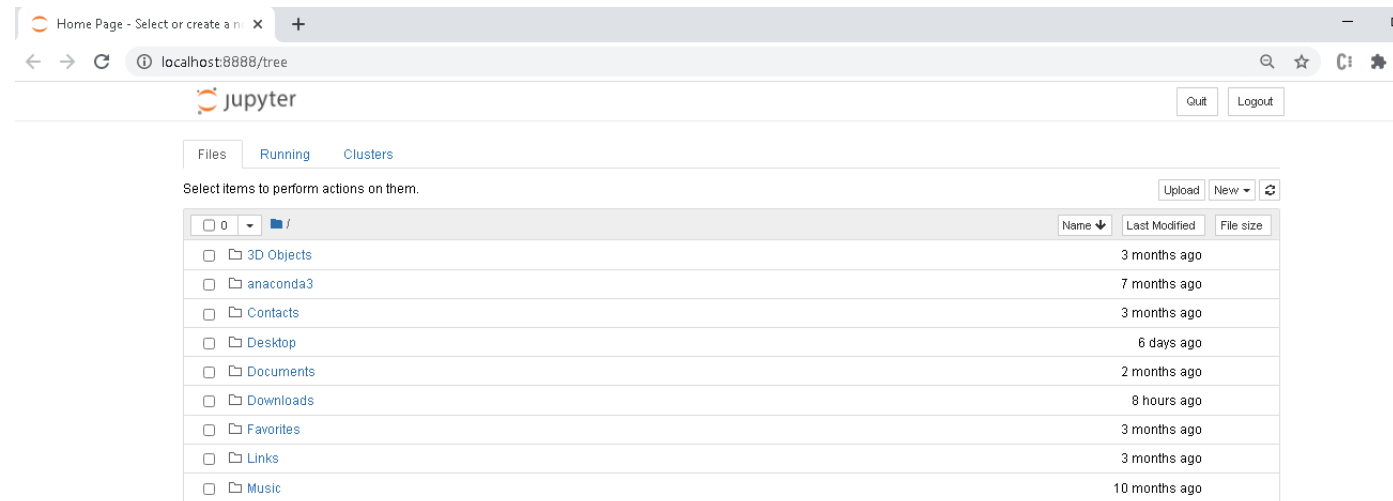
C:\Users\ADMIN>pip install jupyter
Collecting jupyter
  Using cached jupyter-1.0.0-py2.py3-none-any.whl (2.7 kB)
Collecting nbconvert
  Downloading nbconvert-6.0.7-py3-none-any.whl (552 kB)
    |████████████████████| 552 kB 2.2 MB/s
Collecting jupyter-console
  Downloading jupyter_console-6.2.0-py3-none-any.whl (22 kB)
Collecting ipykernel
```

Starting Jupyter Notebook

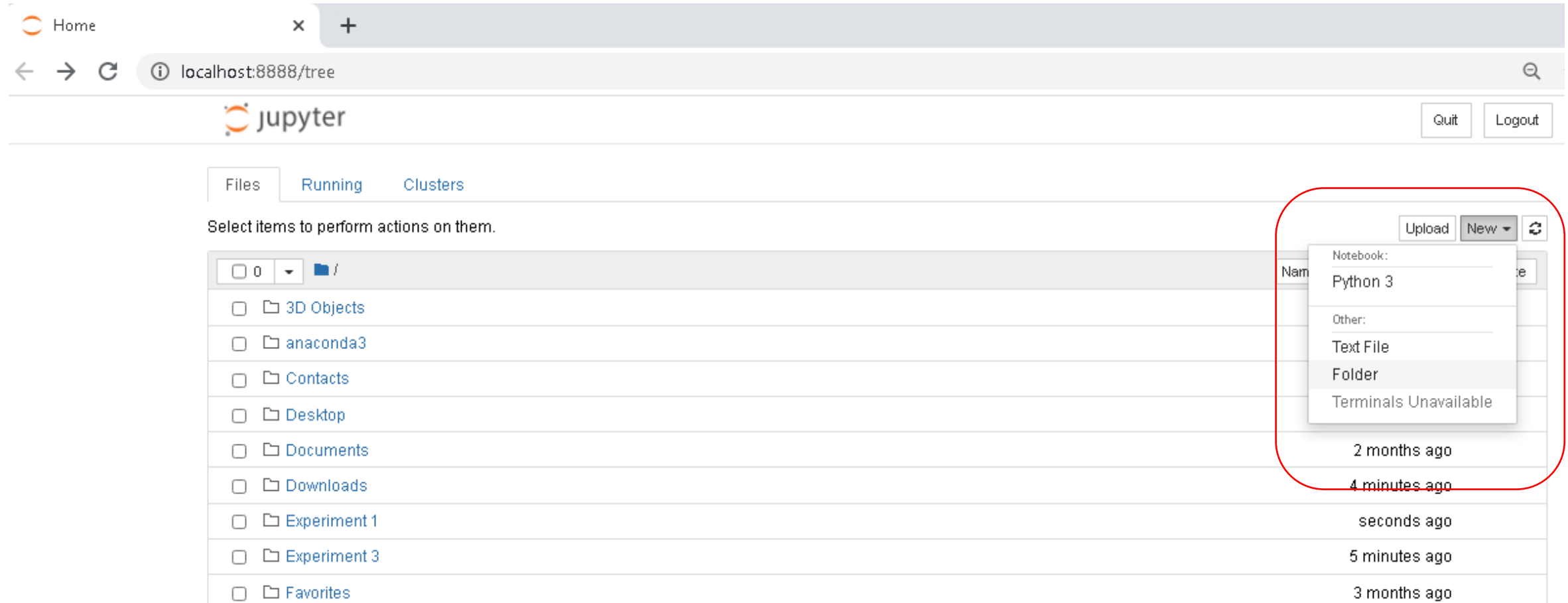
```
cmd Command Prompt - jupyter notebook

Microsoft Windows [Version 10.0.19041.746]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\ADMIN>jupyter notebook
[W 18:53:21.597 NotebookApp] Terminals not available (error was No module named 'winpty.cython')
[W 18:53:21.598 NotebookApp] Error loading server extension jupyter_tabnine
Traceback (most recent call last):
  File "c:\users\admin\appdata\local\programs\python\python39\lib\site-packages\notebook\notebookapp.py", line 114, in init_server_extensions
    mod = importlib.import_module(modulename)
  File "c:\users\admin\appdata\local\programs\python\python39\lib\importlib\__init__.py", line 127, in import
```



Jupyter Notebook



The screenshot displays the Jupyter Notebook web interface in a browser. The address bar shows 'localhost:8888/tree'. The interface includes a 'Home' button, a search icon, and 'Quit' and 'Logout' buttons. Below the Jupyter logo, there are tabs for 'Files', 'Running', and 'Clusters'. A message says 'Select items to perform actions on them.' The file browser shows a list of folders: '3D Objects', 'anaconda3', 'Contacts', 'Desktop', 'Documents', 'Downloads', 'Experiment 1', 'Experiment 3', and 'Favorites'. A red circle highlights the 'New' dropdown menu, which is open and shows options: 'Notebook: Python 3', 'Other: Text File', 'Folder', and 'Terminals Unavailable'. The 'New' button is also visible next to the 'Upload' button.

Home x +

localhost:8888/tree

jupyter

Quit Logout

Files Running Clusters

Select items to perform actions on them.

0 /

- 3D Objects
- anaconda3
- Contacts
- Desktop
- Documents
- Downloads
- Experiment 1
- Experiment 3
- Favorites

Upload New

Notebook: Python 3

Other: Text File

Folder

Terminals Unavailable

2 months ago

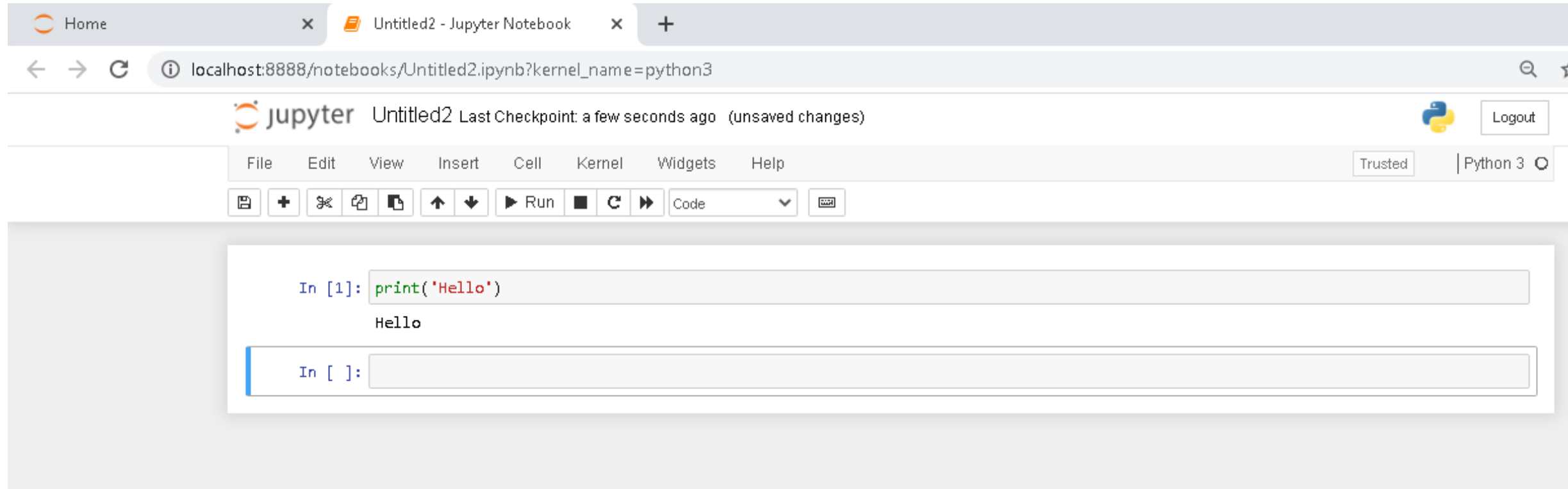
4 minutes ago

seconds ago

5 minutes ago

3 months ago

Jupyter Notebook



The screenshot shows a web browser window with two tabs: 'Home' and 'Untitled2 - Jupyter Notebook'. The address bar shows the URL 'localhost:8888/notebooks/Untitled2.ipynb?kernel_name=python3'. The Jupyter Notebook interface is displayed, featuring a top bar with the 'jupyter' logo, the notebook title 'Untitled2', and a status message 'Last Checkpoint: a few seconds ago (unsaved changes)'. A 'Logout' button is visible in the top right. Below the top bar is a menu bar with options: File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. A 'Trusted' status indicator and 'Python 3' are shown on the right. A toolbar contains icons for file operations (save, new, open, save as, reload), navigation (up, down), execution (run, interrupt, restart), and a dropdown menu currently set to 'Code'. The main workspace contains two code cells. The first cell, labeled 'In [1]:', contains the code `print('Hello')` and has executed, displaying the output 'Hello'. The second cell, labeled 'In []:', is currently empty and has a blue cursor at the start of the input line.

Home x Untitled2 - Jupyter Notebook x +

localhost:8888/notebooks/Untitled2.ipynb?kernel_name=python3

jupyter Untitled2 Last Checkpoint: a few seconds ago (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted | Python 3

Save New Open Save As Reload Up Down Run Interrupt Restart Code

```
In [1]: print('Hello')
```

Hello

```
In [ ]:
```

Google Colab Notebook

The screenshot shows a Google Colab Notebook interface. The browser address bar displays the URL: `colab.research.google.com/drive/1rLiZEEGd7cCEZV-De5dOKhGggWMq-RP6`. The notebook title is `Datatypes.ipynb`, and it was last edited on January 31. The interface includes a menu bar with options: File, Edit, View, Insert, Runtime, Tools, and Help. A sidebar on the left contains a 'Table of contents' panel with a search icon and a list of sections: 'Datatypes in Python' (expanded), 'Comments in python', 'Docstring', 'Variables', 'Built-in datatypes', 'Sequences in python', 'Sets datatype', 'frozenset datatype', 'Mapping types', 'Literals in python', 'Determining the datatype of a variable', 'Python identifiers', 'Python keywords', and a 'Section' button. The main content area shows the 'Datatypes in Python' section, which includes a heading 'What we will learn?' followed by a bulleted list of topics: 'Comments in python', 'Docstrings', 'Variables in python', 'Built-in datatypes', 'Sequences in python', 'Sets datatype', 'Mapping types', 'Literals & constants in python', 'Determining the datatype of a variable', and 'Identifiers & reserved words'. Below this list, there is a code cell with the text 'Let us run our very first program in python' and a Python code snippet:

```
[ ] #Program to add two new numbers
a=5
b=7
c=a+b
print("Sum=",c)
```