

— THE ART OF —

PYTHON

PROGRAMMING

Beginner's Guide



Dr.S.Suganthi Ph.D.,NET
Dr.D.Usha Ph.D.,SET.,

Python Programming- Beginner's Guide

Dr. S. Suganthi Ph.D., NET.,

Dr. D. Usha Ph.D., SET.,

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CHAPTER-1

INTRODUCTION

The main objective of this book is to teach you to think like a computer programmer. Programmers have the inbuilt skills like engineers, mathematicians. In mathematics, declare their ideas via formulas and theorems. Like engineers denote their ideas via design patterns, integration of the components. Thus the programmer has the most important skill as problem solving. After successfully completing this book, students are able to solve the problem through programming.

This book covers the core concepts of Python programming both theoretical as well as coding concepts with appropriate quiz, assignments, coding exercises, mini projects.

1.1 What is called a program?

If you complete any task, sequence of steps and procedures are there. For example to buy a grocery in a super market, initially you prepare the list of items based on your budget(Input). After that you go to store and buy all the mentioned items and kept in a basket(Execution) then pay the bill (Output).

The program means it's a sequence of instructions which instruct the computers to solve the problem. Every programming language consists some essential details such as:

Input: Get the data from the keyboard

Statements: problem related execution steps which may be mathematical or conditional statements.

Output: To display the results on the screen

Computers can understand only machine language code which means 0 and 1. You interact with the computer through the language which is called as a programming language.

1.2 Introduction about Python

In this book, we cover all the core concepts about python. Python is a user friendly and beginner friendly course. if you do not have any previous knowledge about any programming language, you can easy to learn and expertise.

After completing two chapters , you will get good basic knowledge about python as well as boost up your confidence level. Now a days, python is a popular and fastest growing programming language. The concept of python came into picture in 1989. It has so many advantages:

1. Most of the research areas python being used such as machine learning, data science, artificial intelligence, system software development, game development, app development etc.
2. Python is very simple and easy to understand.
3. You can solve any problem with less lines of coding.
4. It is a high level language

5. It has inbuilt memory management.
6. It supports multiple paradigms like object oriented, procedural and functional.
7. It has very large inbuilt library and packages.
8. It's an open source language
9. It has a large community and discussion forum.
10. It will give you a lot of career opportunities with high salary.

Generally, the compiler is used to convert the high level language code to machine level code. Eg: C, C++ is a compiler oriented language. But python is an interpreter oriented language. The original source code is converted into python byte code this is an intermediate instruction, then it will send it to the python virtual machine.



CHAPTER-2

History of Python

Python was developed by a dutch programmer Guido Vandross. In 1989, during the christmas holidays, he was working in CWI centrum wiskunde & informatica center in distributed operating system. He has already experience in abc programming language. He was started to design a new programming language . python is a successor of abc programming language.

During 1985, one british TV Series named as monty python's flying circus. It was a comedy circus series, he is a big fan of this program. So he took the name from this series and named it his new programming language.

Python is very old language it was developed before java. Java was developed at 1995, but python

was developed at 1989. In 1991, the first version was developed that was known as 0.9.0. later on the official version was released with some additional features with the existing version.

Version No	Year
1.0	1994
1.1	1994
1.2	1995
1.3	1995
1.4	1996
1.5	1998
1.6	2000
2.0	2000
2.1	2001
2.2	2001
2.3	2003
2.4	2004
2.5	2006
2.6	2008

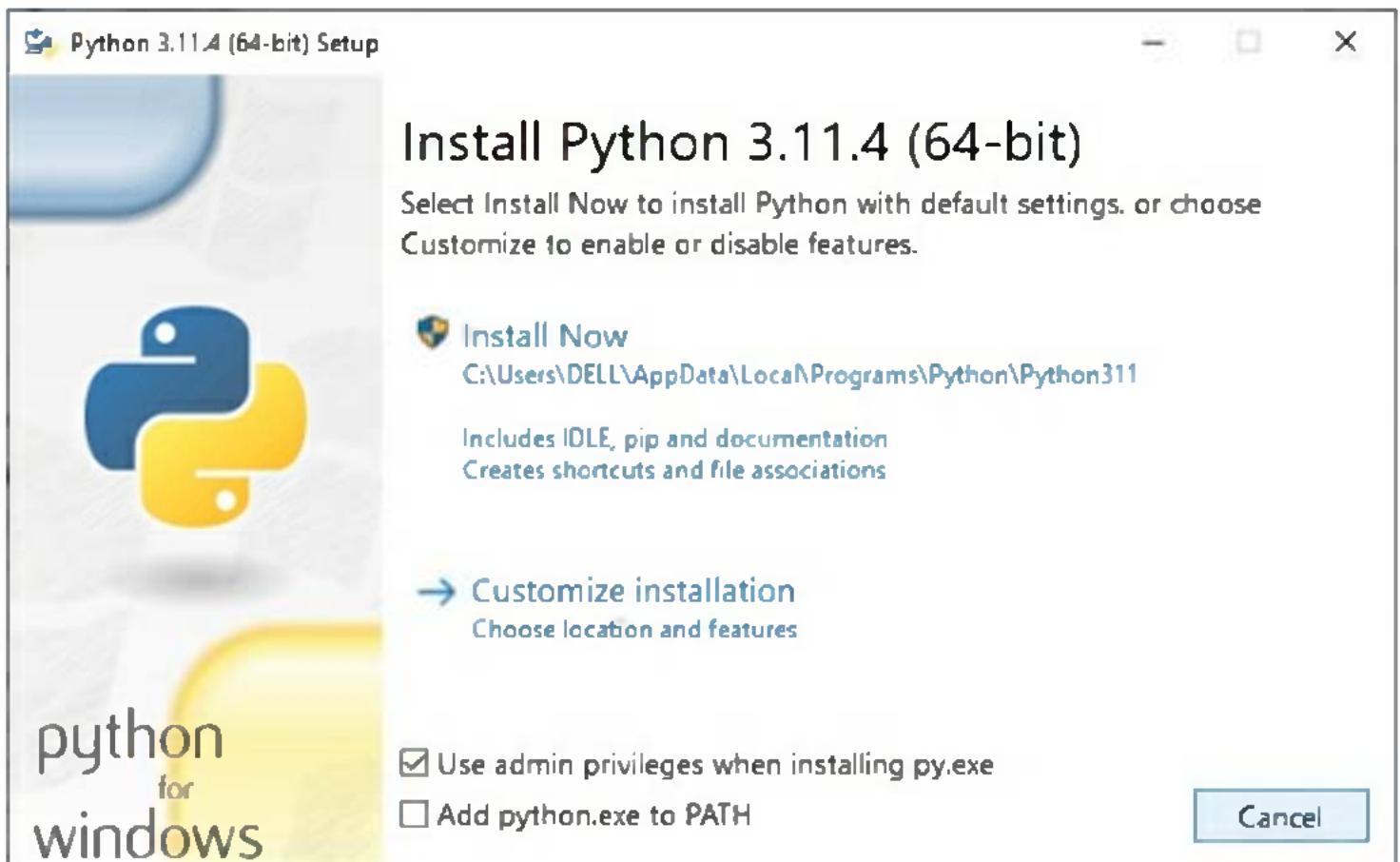
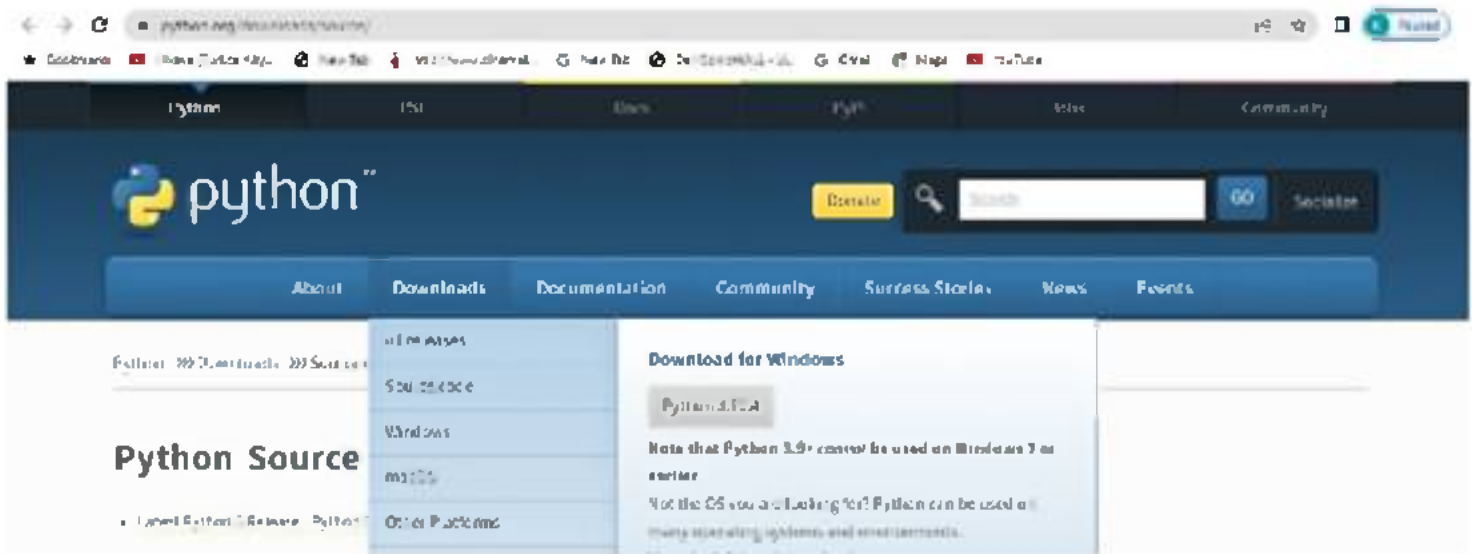
2.7	2010
Version No	Year
3.0	2008
3.1	2009
3.2	2011
3.3	2012
3.4	2014
3.5	2015
3.6	2016
3.7	2018
3.8	2019
3.9	2020
3.10	2021
3.11	2022
3.11.4	2023

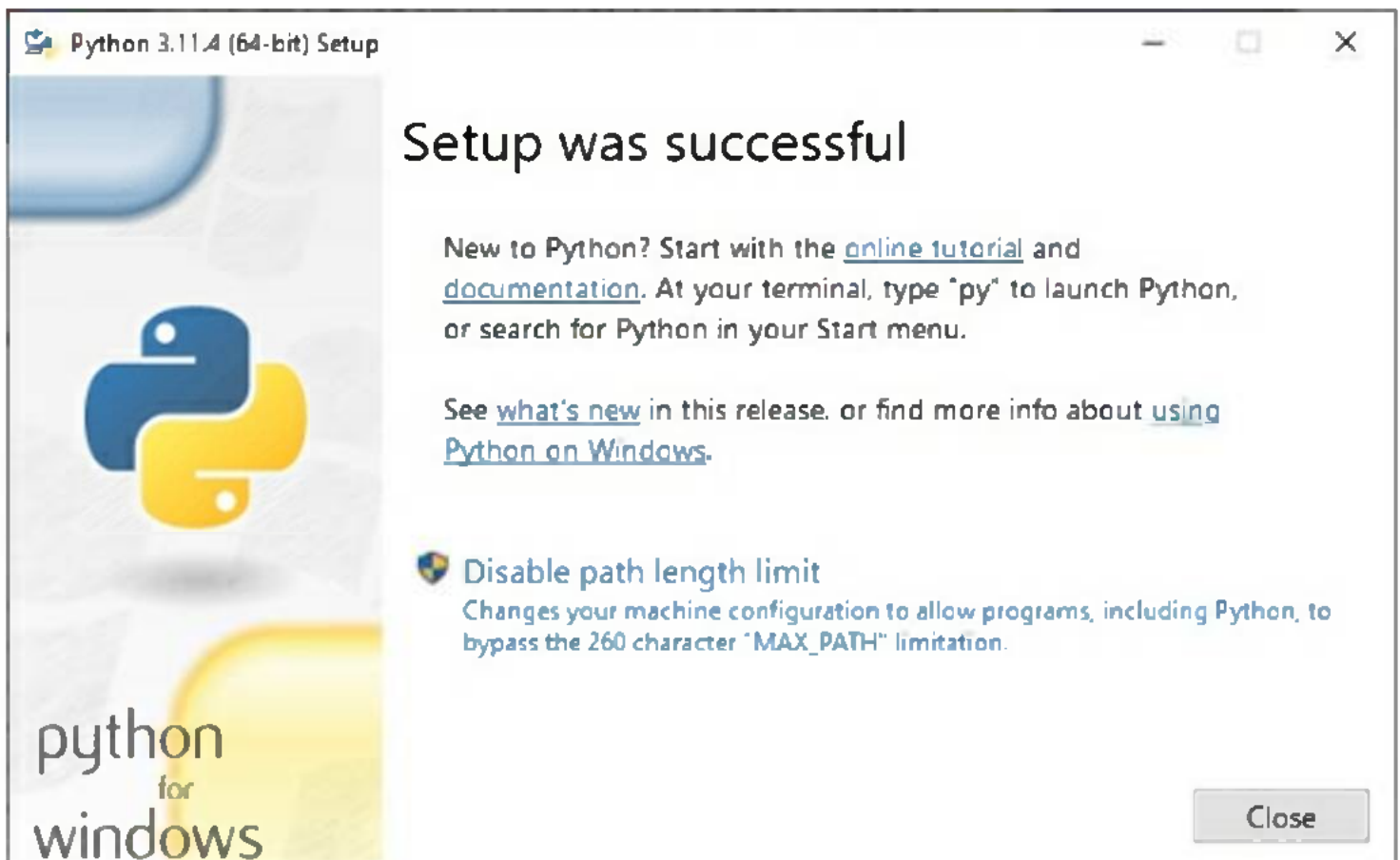
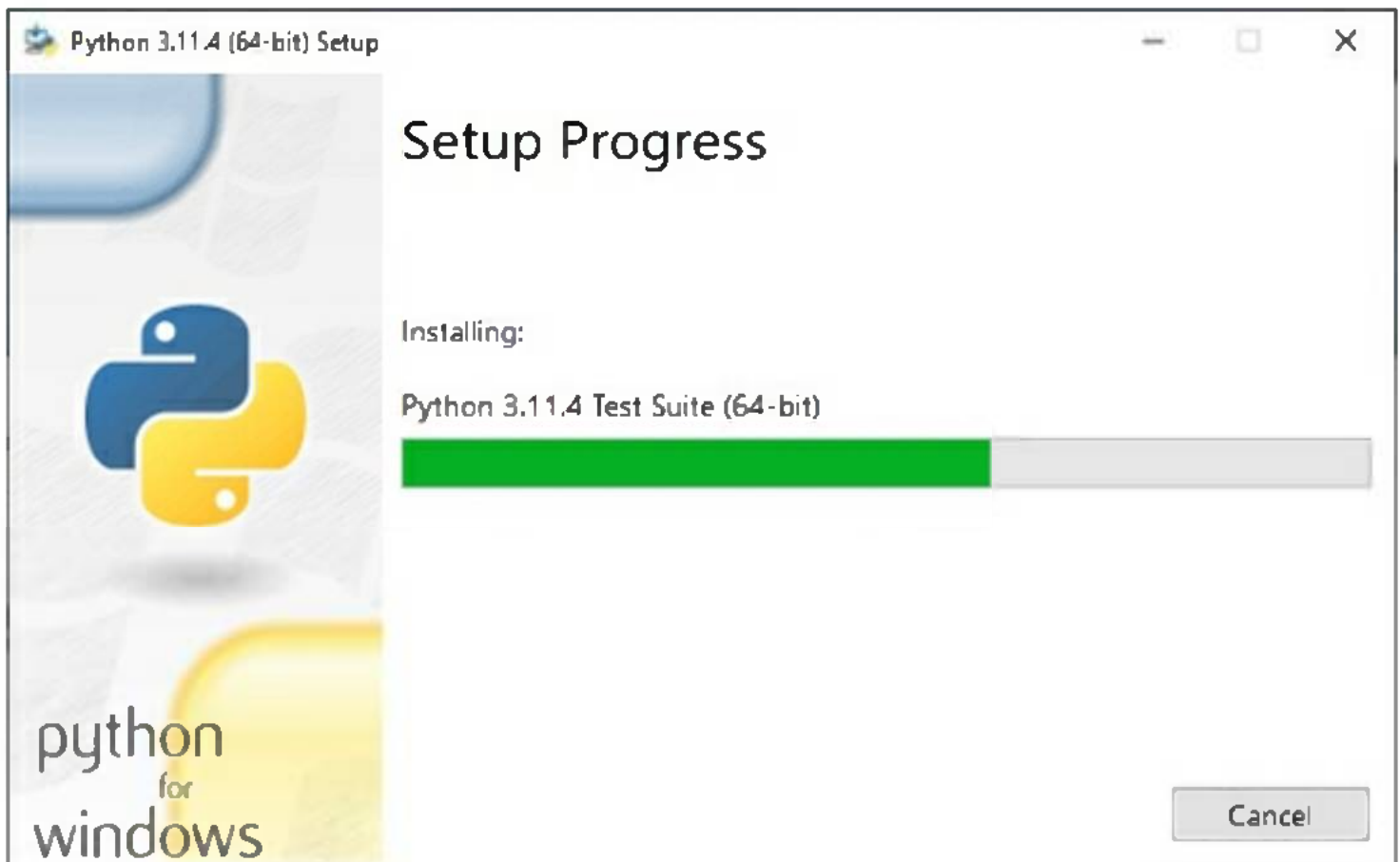
CHAPTER-3

DOWNLOAD AND INSTALL PYTHON

3.1 Installation Steps:

Step 1: First and foremost step is to open a browser and type <https://www.python.org/downloads/>





IDLE Shell 3.11.4



File Edit Shell Debug Options Window Help

Python 3.11.4 (tags/v3.11.4:d2340ef, Jun 7 2023, 05:45:37) [MSC v.1934 64 bit (AMD64)] on win32

Type "help", "copyright", "credits" or "license()" for more information.

>>> |

Ln: 3 Col: 0

A screenshot of the Python IDLE Shell 3.11.4 window. The window title is 'IDLE Shell 3.11.4'. The menu bar includes 'File', 'Edit', 'Shell', 'Debug', 'Options', 'Window', and 'Help'. The main text area shows the following text: 'Python 3.11.4 (tags/v3.11.4:d2340ef, Jun 7 2023, 05:45:37) [MSC v.1934 64 bit (AMD64)] on win32', 'Type "help", "copyright", "credits" or "license()" for more information.', and a prompt '>>>' followed by the code 'print("Hello World")' and its output 'Hello World'. The status bar at the bottom right shows 'Ln: 5 Col: 0'.

This is the Python Interpreter screen also called Python Shell. I printed Hello world. The three greater than >>> sign is called Python command prompt,

First python program:

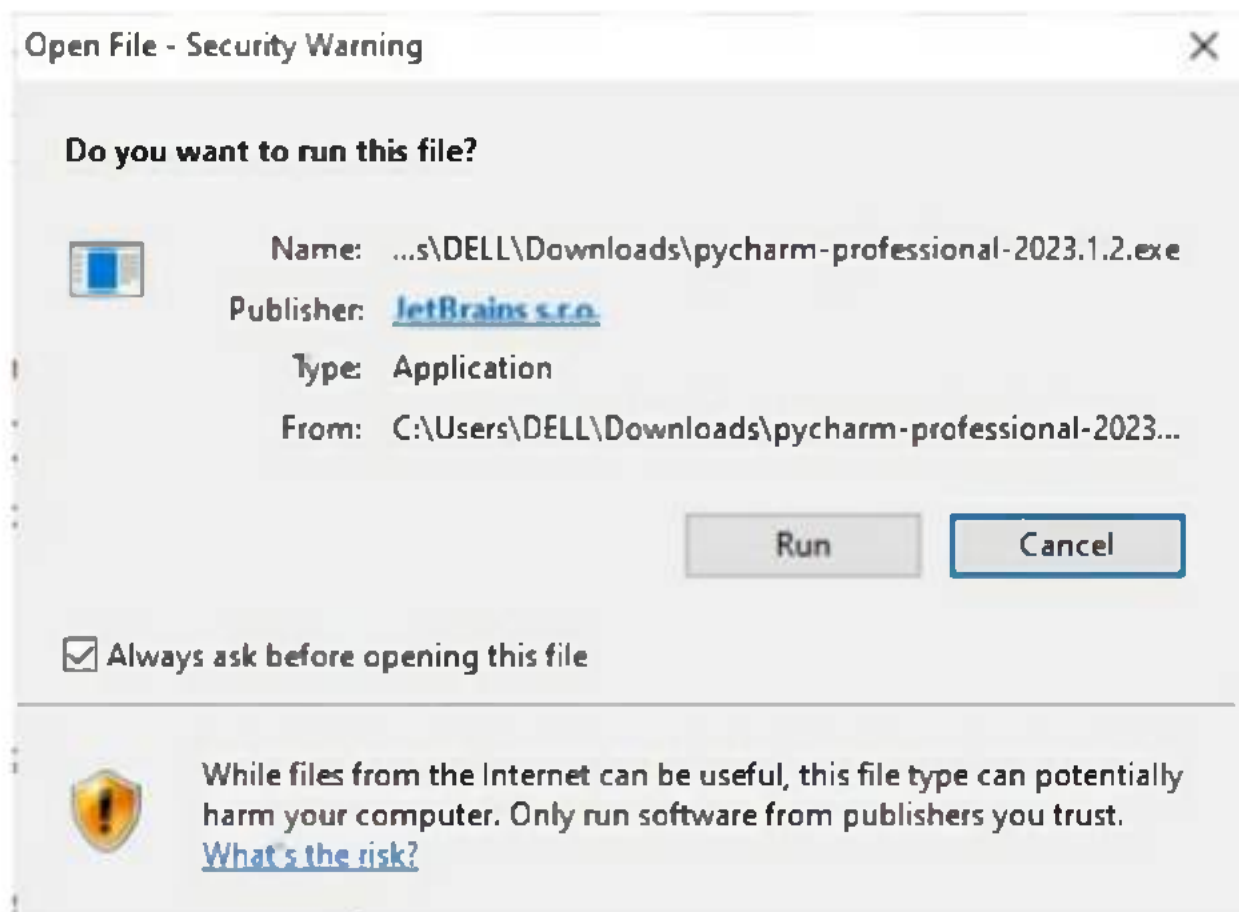

```
Python 3.11.4 (tags/v3.11.4:d2340ef, Jun 7 2023, 05:45:37) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> 5+5
10
>>> print("This is the interactive mode of python")
This is the interactive mode of python
>>> 10-6
4
>>> 6*7
42
>>> 7/3
2.3333333333333335
>>> 8//4
2
>>> 8%4
0
>>>
```

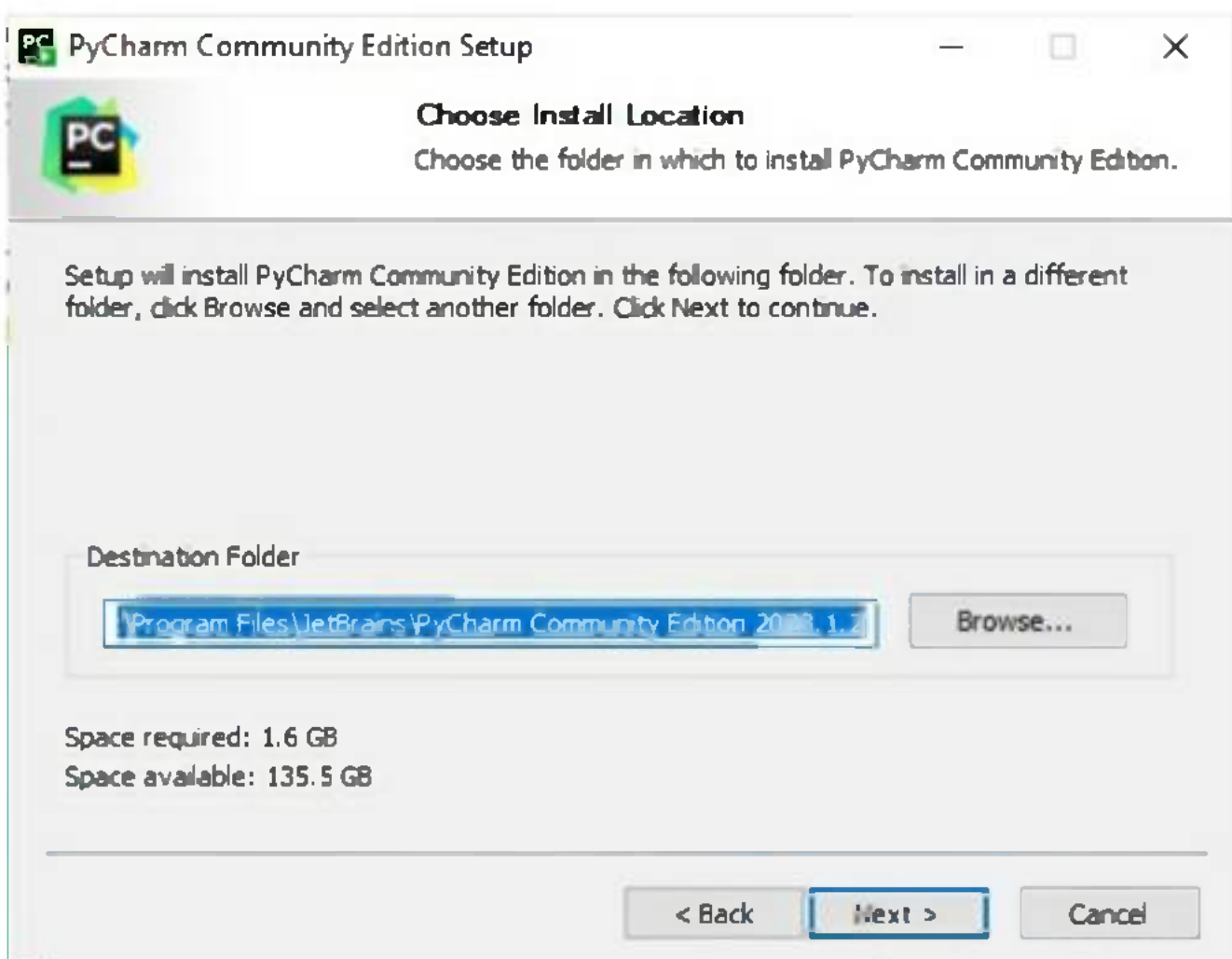
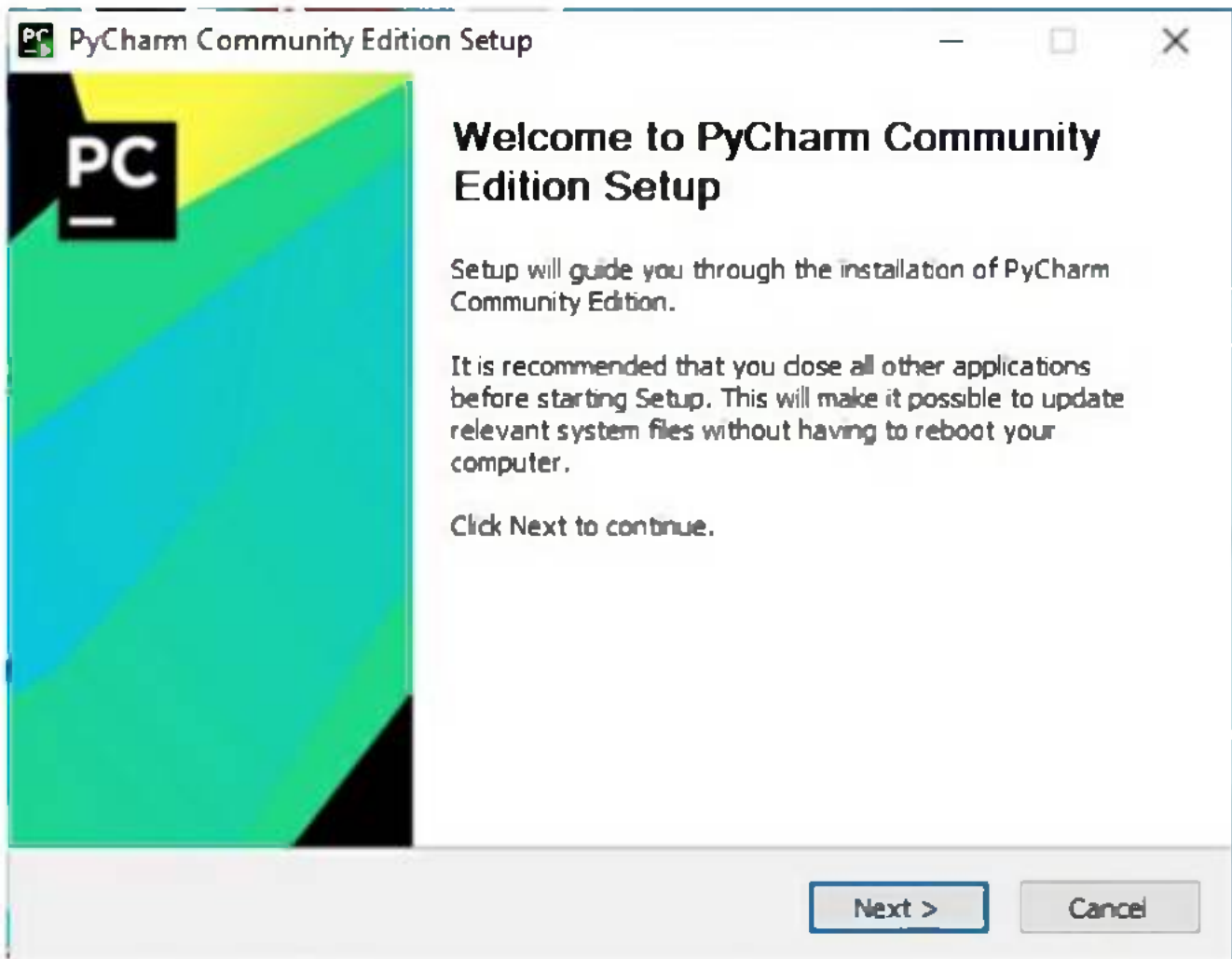
The above diagram illustrates the Python interactive mode. You can type a program then the output will return immediately. You cannot save the program in interactive mode. If you want to run a large program go for script mode.

The another mode of python run mode as python script mode.

You can store Python script source code in a file with .py extension, and use the interpreter to execute the contents of the file.

3.2 Pycharm installation:







Installation Options

Configure your PyCharm Community Edition installation

Create Desktop Shortcut

PyCharm Community Edition

Update PATH Variable (restart needed)

Add "bin" folder to the PATH

Update Context Menu

Add "Open Folder as Project"

Create Associations

.py

< Back

Next >

Cancel



Choose Start Menu Folder

Choose a Start Menu folder for the PyCharm Community Edition shortcuts.

Select the Start Menu folder in which you would like to create the program's shortcuts. You can also enter a name to create a new folder.

JetBrains

- Accessibility
- Accessories
- Administrative Tools
- Cygwin
- Dell Audio
- Github, Inc
- IIS
- Intel
- KMSpico
- Maintenance
- MediaGet2
- Microsoft Office Tools

< Back

Install

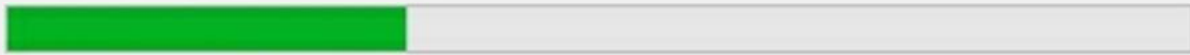
Cancel



Installing

Please wait while PyCharm Community Edition is being installed.

Extract: install_data.pyi... 100%



Show details

< Back

Next >

Cancel



Completing PyCharm Community Edition Setup

Your computer must be restarted in order to complete the installation of PyCharm Community Edition. Do you want to reboot now?

Reboot now

I want to manually reboot later

< Back

Finish

Cancel



Projects

Customize

Plugins

Learn

Welcome to PyCharm

Create a new project to start from scratch.
Open existing project from disk or version control.



New Project



Open



Get from VCS

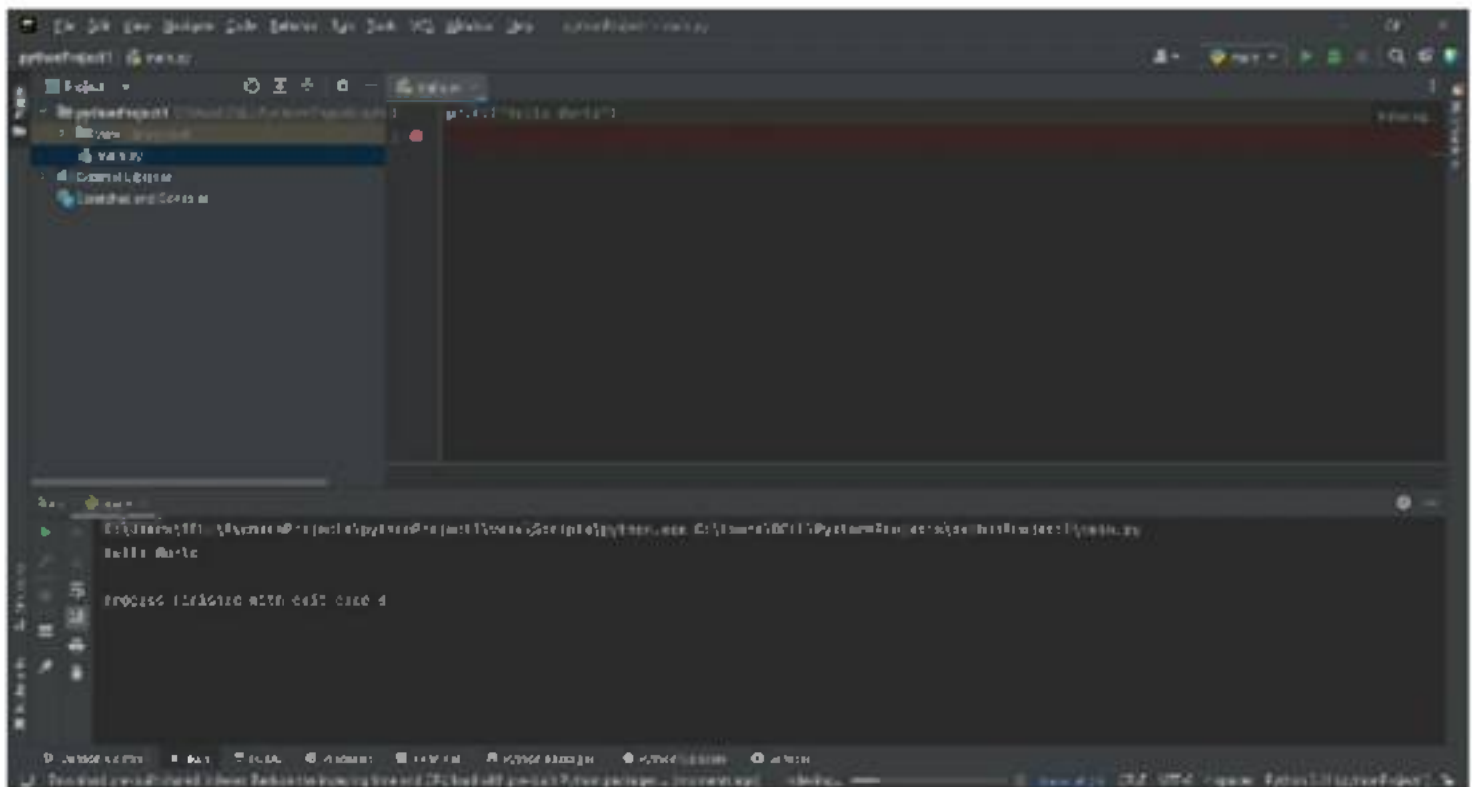
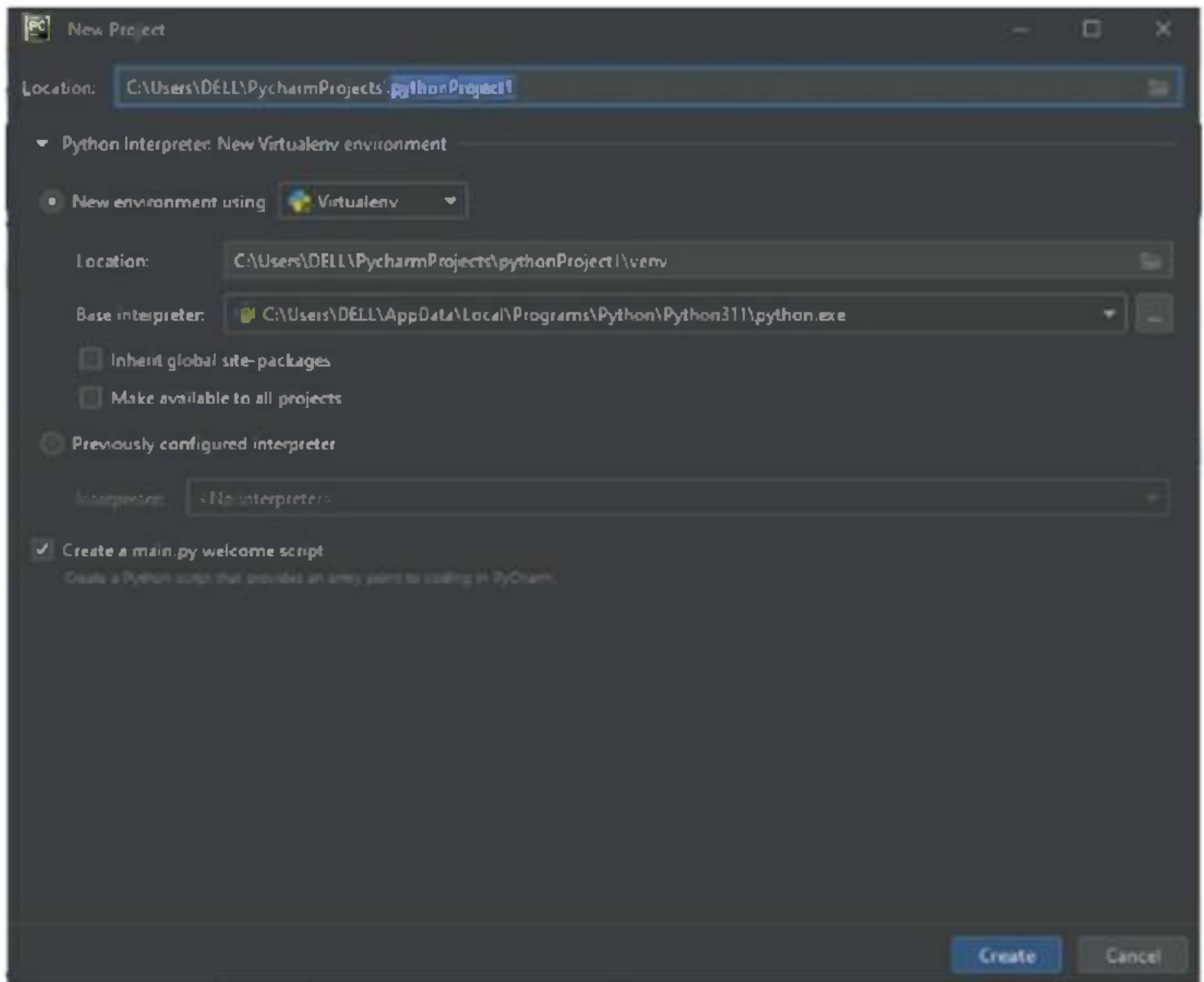


Meet the New UI Beta

PyCharm got a modern `mac` design — with reduced visual complexity, fewer distractions, and the same power

Enable New UI





3.3 Input function in Python:

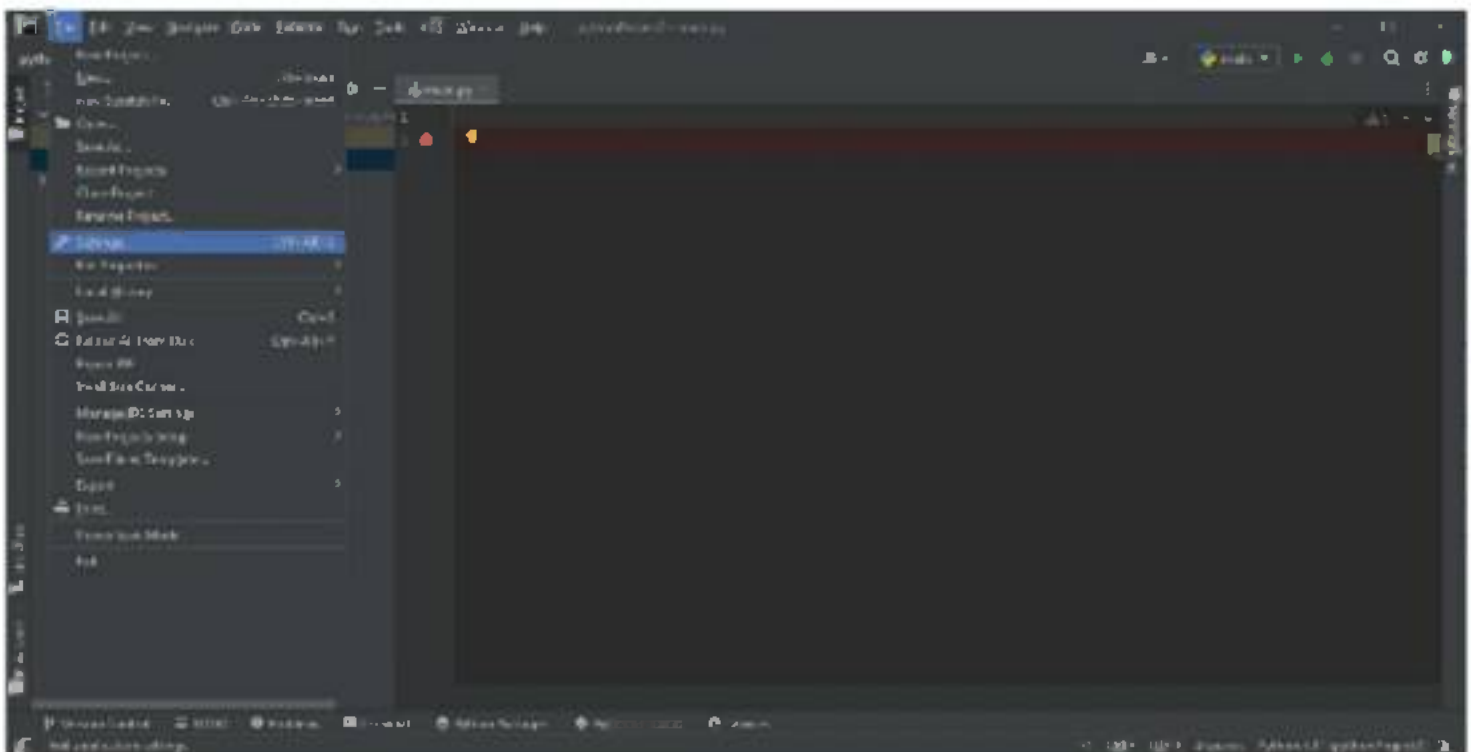
When you give the input using input function.

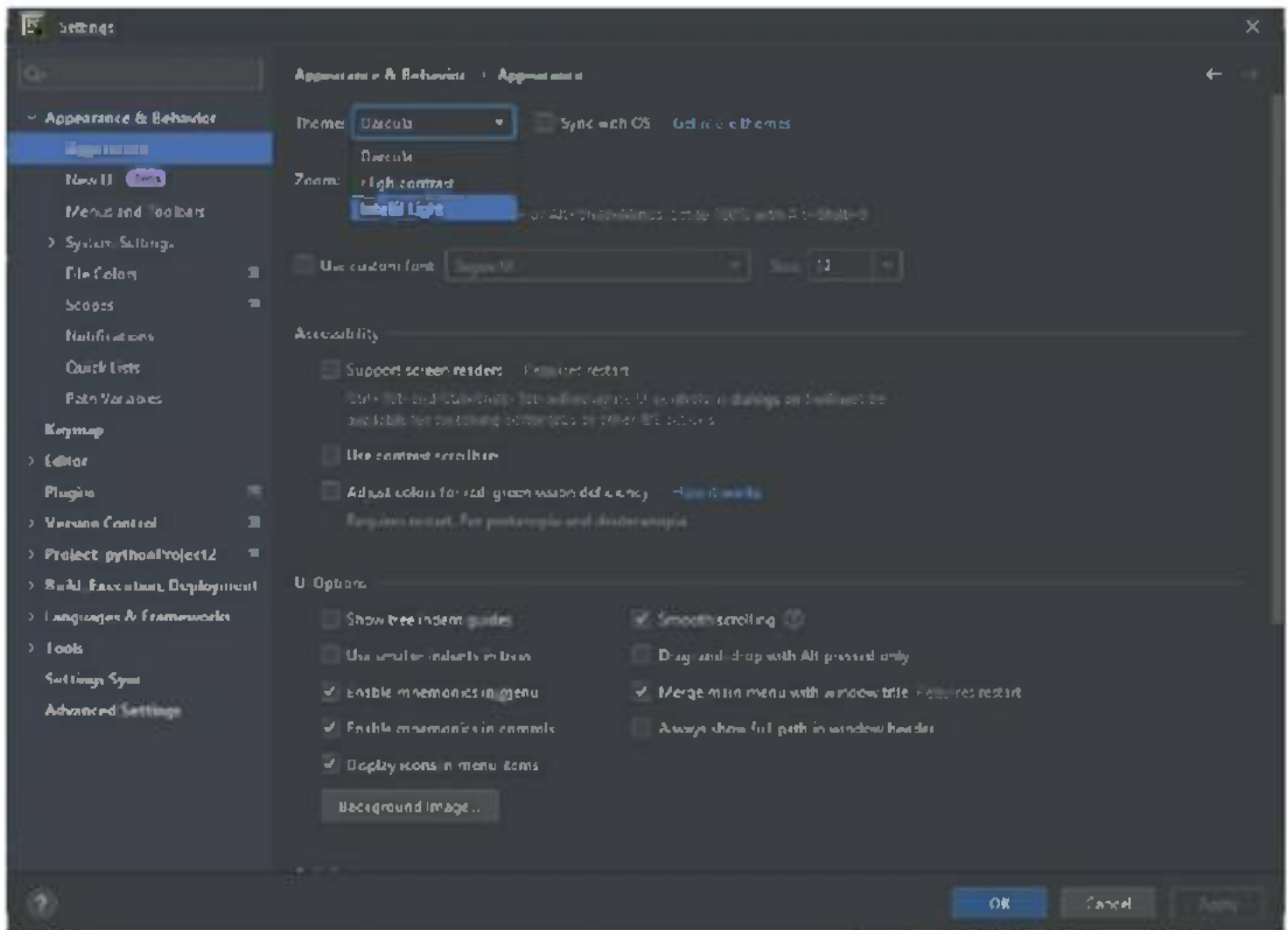
The syntax of input function as:

```
Input("Enter the first number")
```

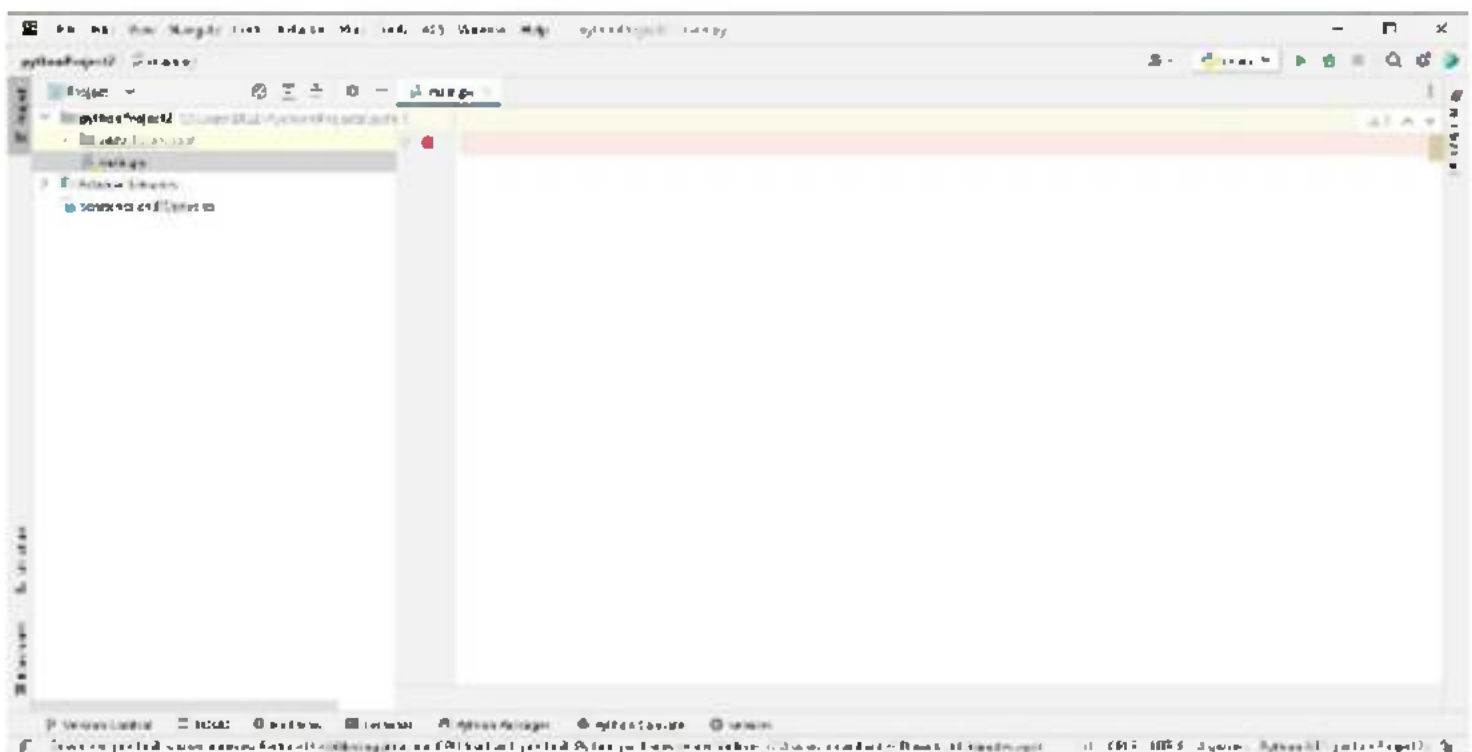
```
Print("Hai,Hello "+" "+input("Enter your name?"))
```

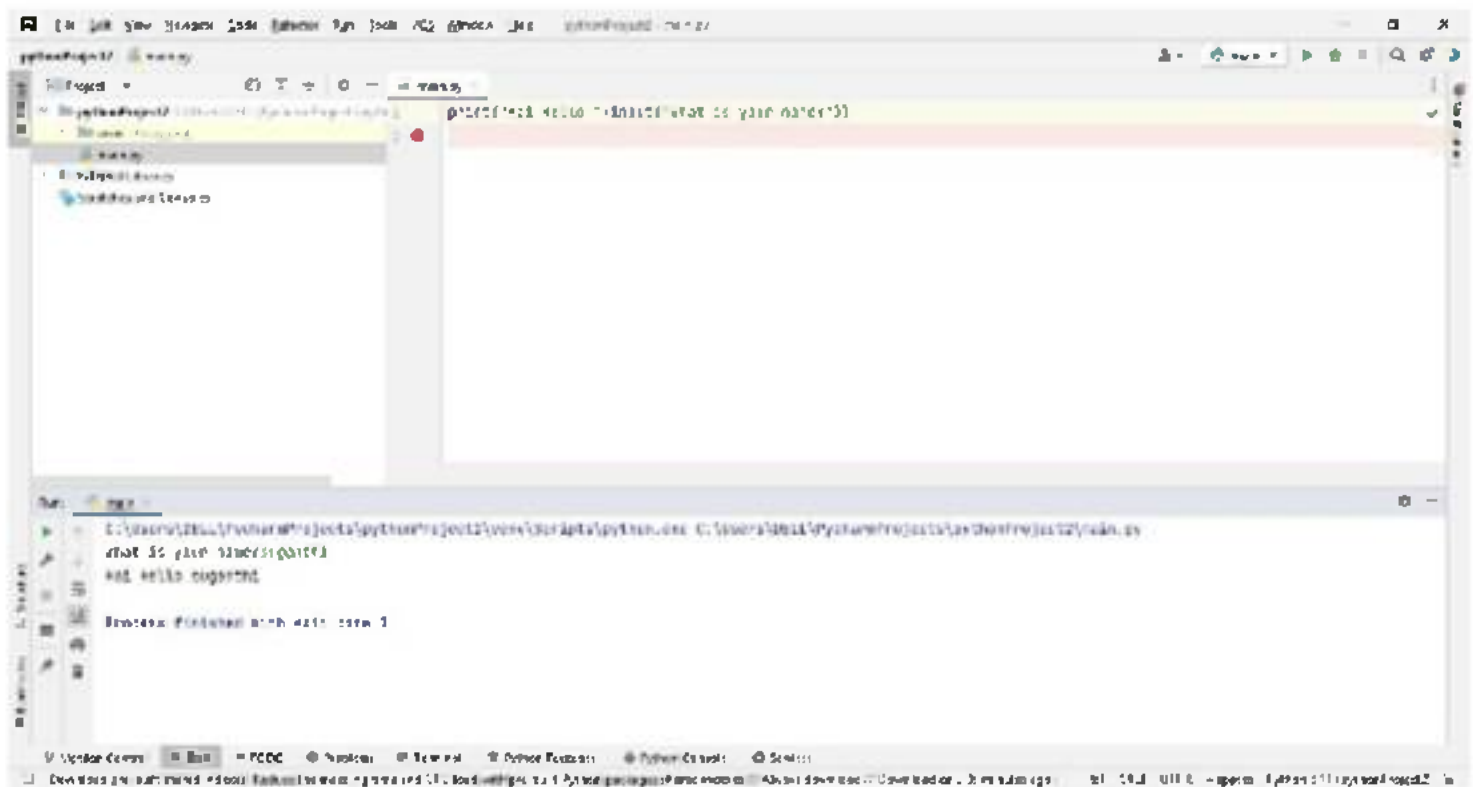
Change the appearance of pycharm window:





Your pycharm window screen will appear like this after the settings:





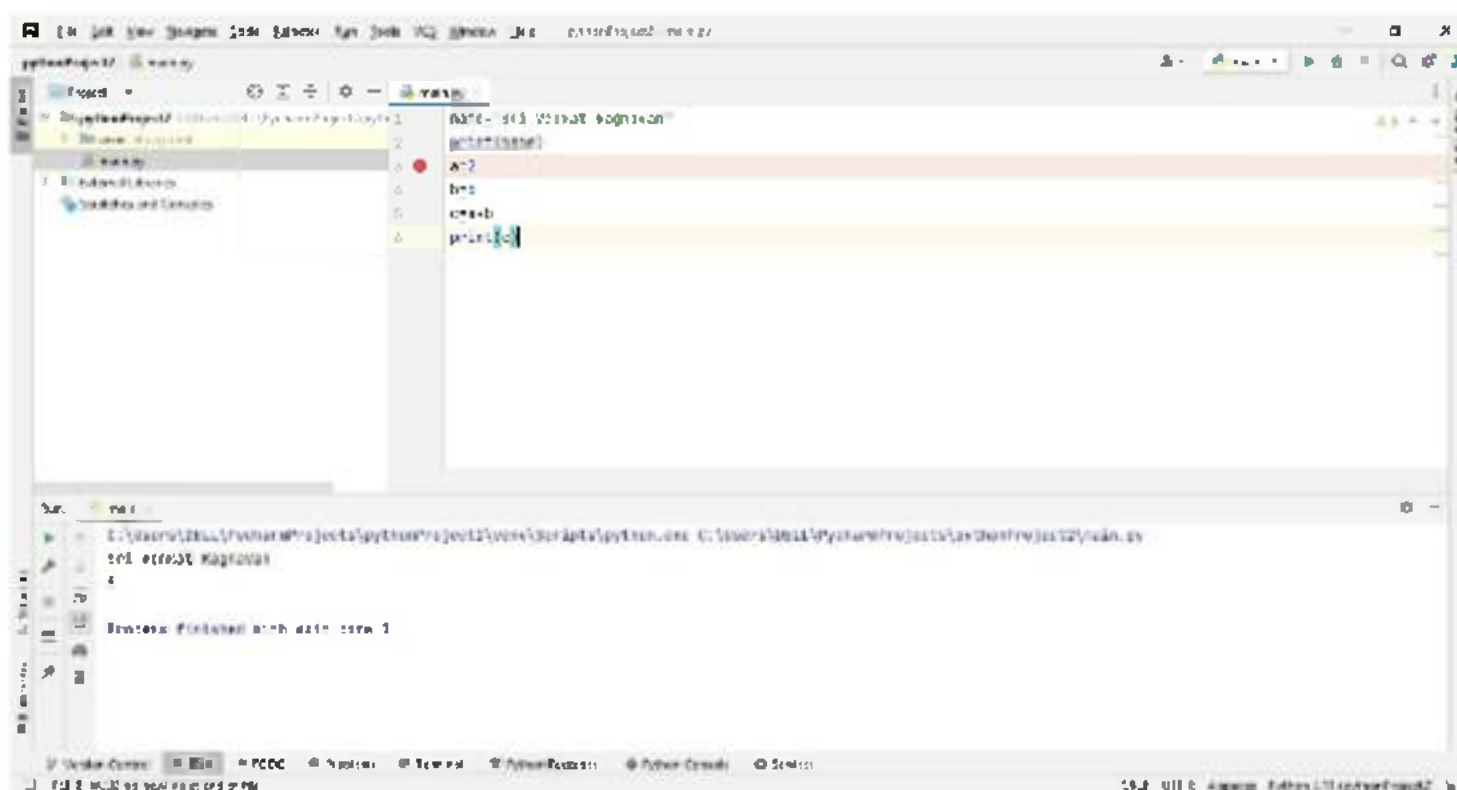
CHAPTER-4

VARIABLES

Variables are nothing but the name of the value. It allocates the reserved memory space to store the values as you given in a program. Based on the given data type the interpreter allocates the

memory for the value. For example when you want to add two numbers, as that you need three input variables and one output variables. When you declare the variable as integer data type, the interpreter allocates two bytes of memory space for each variable.

Syntax: `variable_name=value`



Variable naming rules:

1. A variable name must start with a letter or the underscore character
2. A variable name cannot start with a number

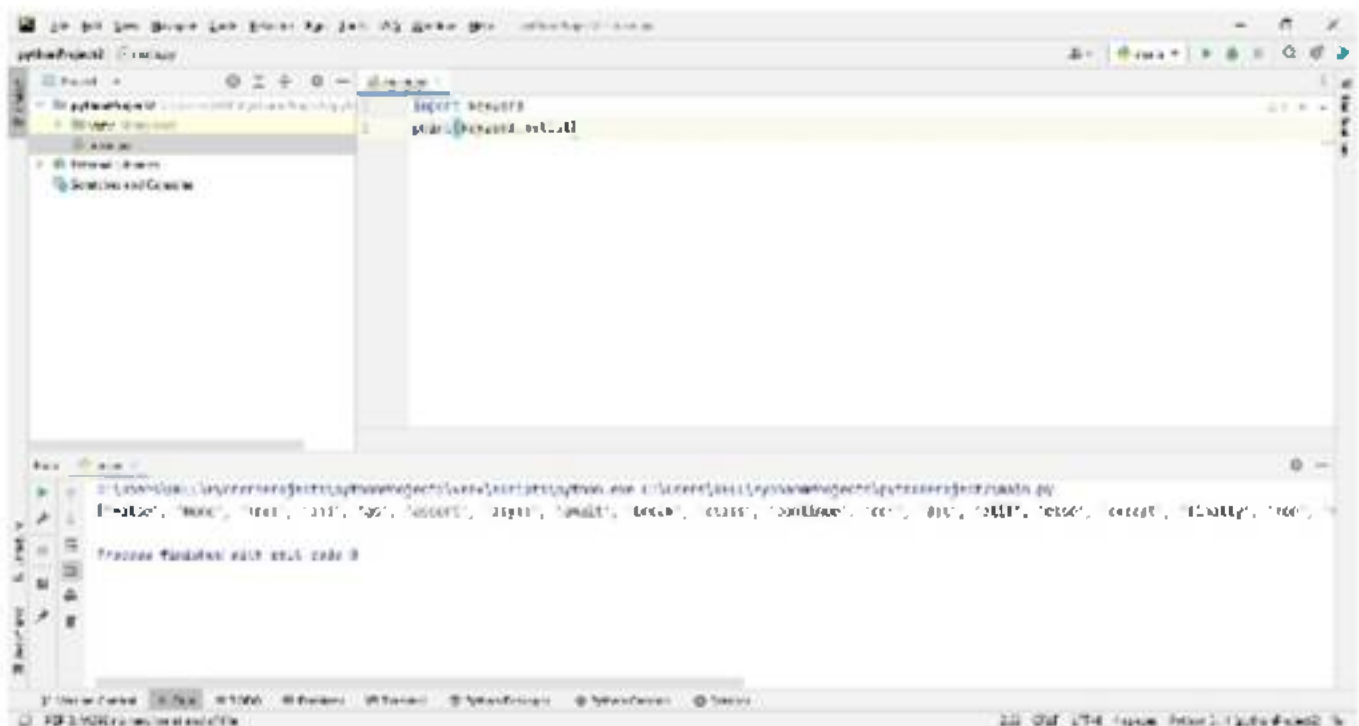
3. A variable name can only contain alpha-numeric characters and underscores (A-z, 0-9, and _)
4. Variable names are case-sensitive.

Keywords:

Keywords are the reserved words which can be used for specific purpose it consists some special properties. if you want to list out the keywords in python by using the following commands:

```
Import keyword
```

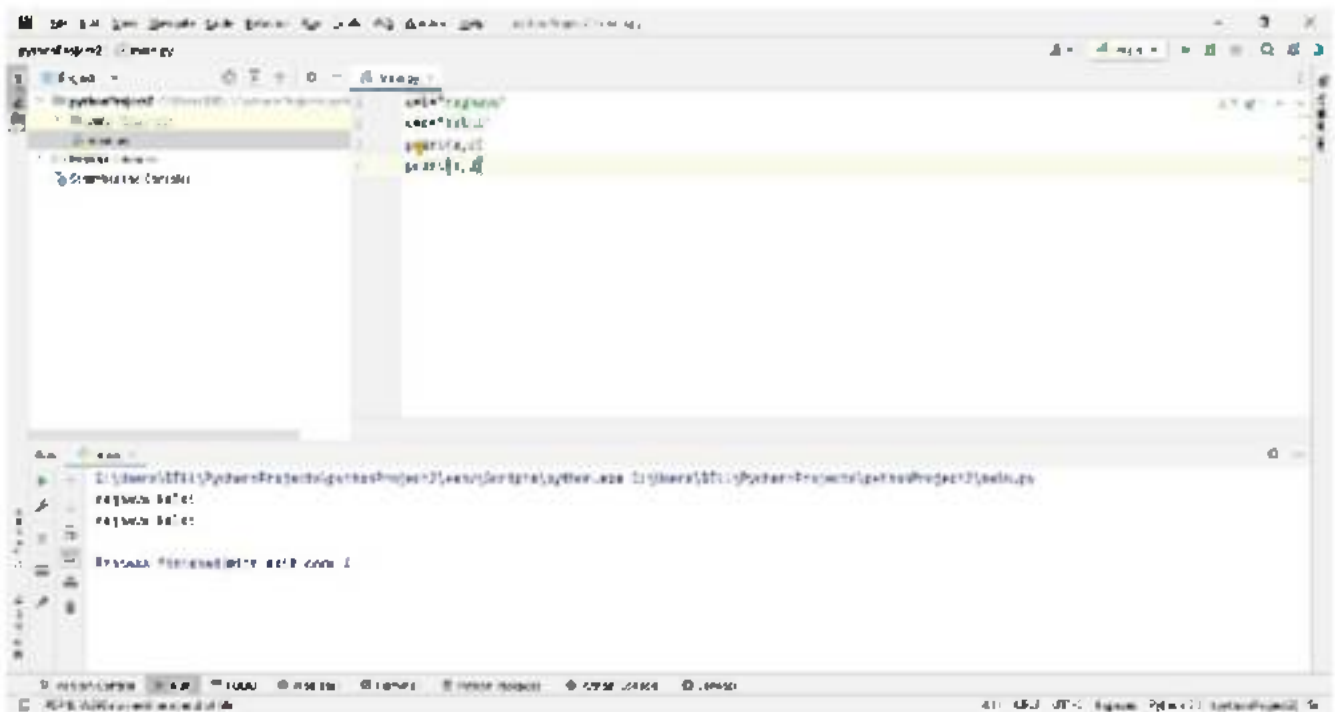
```
Print(keyword.kwlist)
```



Multiple Assignments:

When you assign the same value to a different variables using the below format:

a=b=2



CHAPTER-5

PRIMITIVE DATA TYPES IN PYTHON

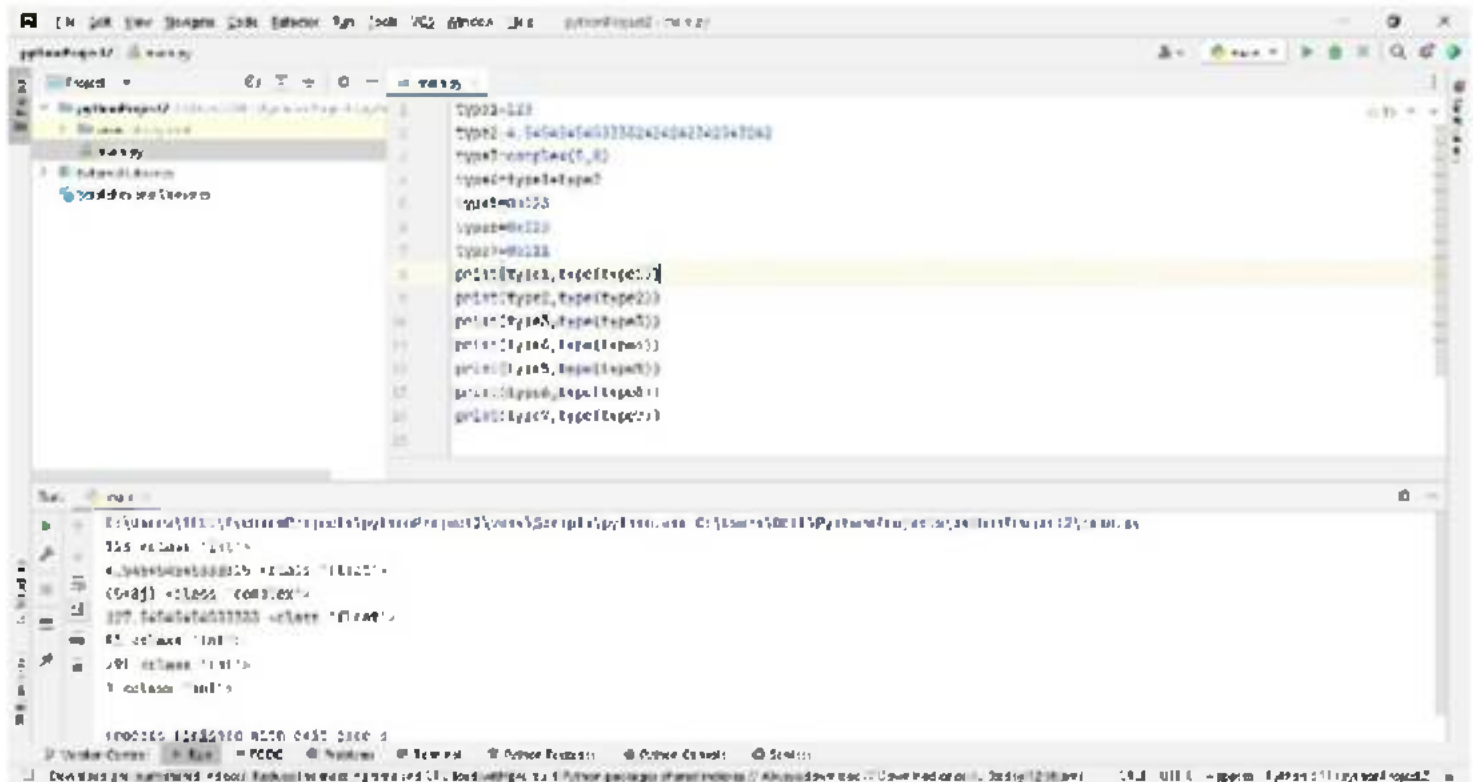
The data stored in different types into a memory. Generally, python has different types

1. Numeric
2. String
3. Boolean
4. List
5. Tuple
6. Dictionary

5.1 Numeric data types:

Numeric data type represents the number. Numbers may be the whole numbers, decimal point numbers and complex numbers. The whole number called as integers. Floating point number means it's

a decimal point numbers upto 15 digits. Complex numbers consists of real part and imaginary part.



The octal number is converted into decimal

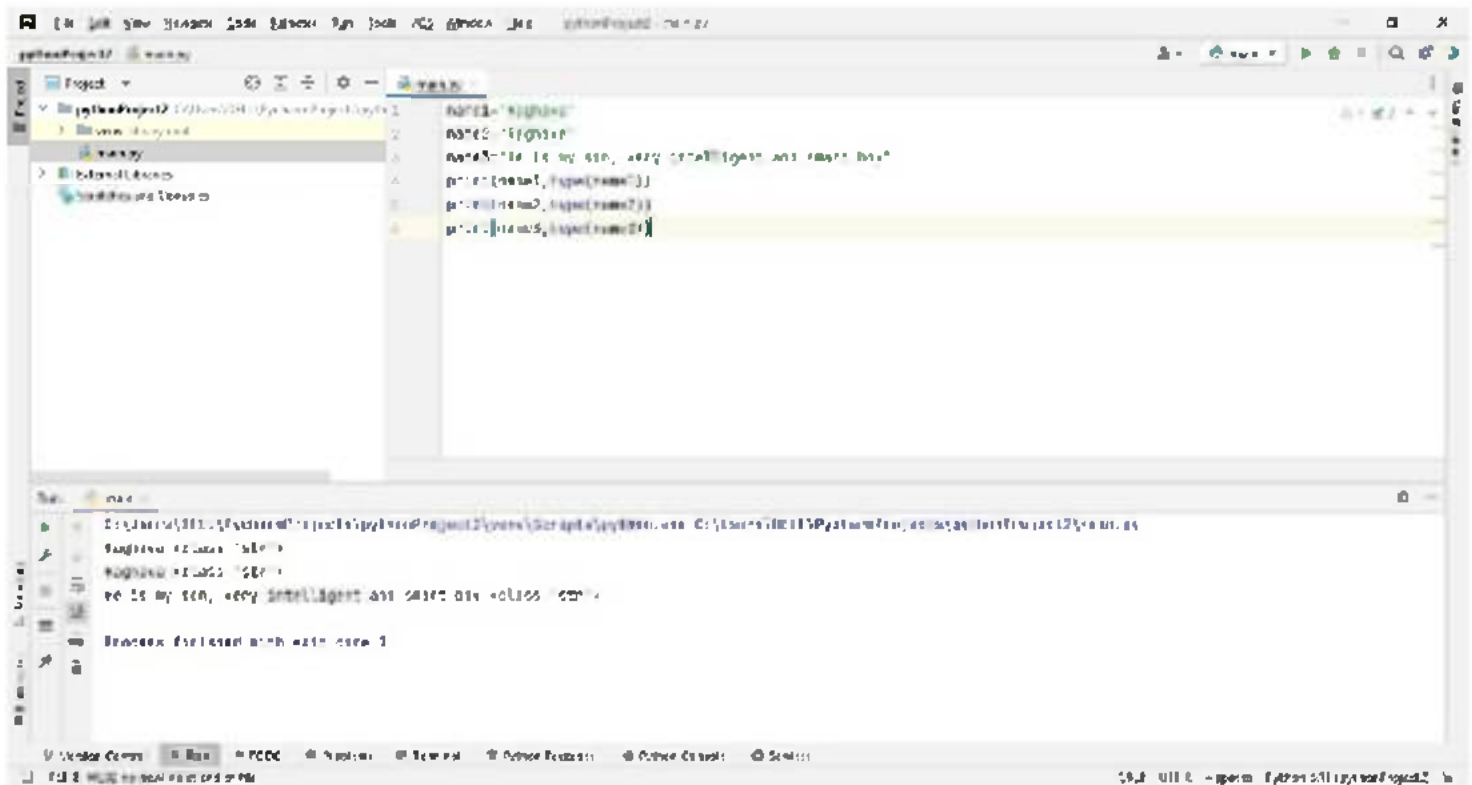
$$123 = (1 \times 8^2) + (2 \times 8^1) + (3 \times 8^0) = 83$$

The hexadecimal number is converted into decimal

$$(123)_{16} = (1 \times 16^2) + (2 \times 16^1) + (3 \times 16^0) = (291)_{10}$$

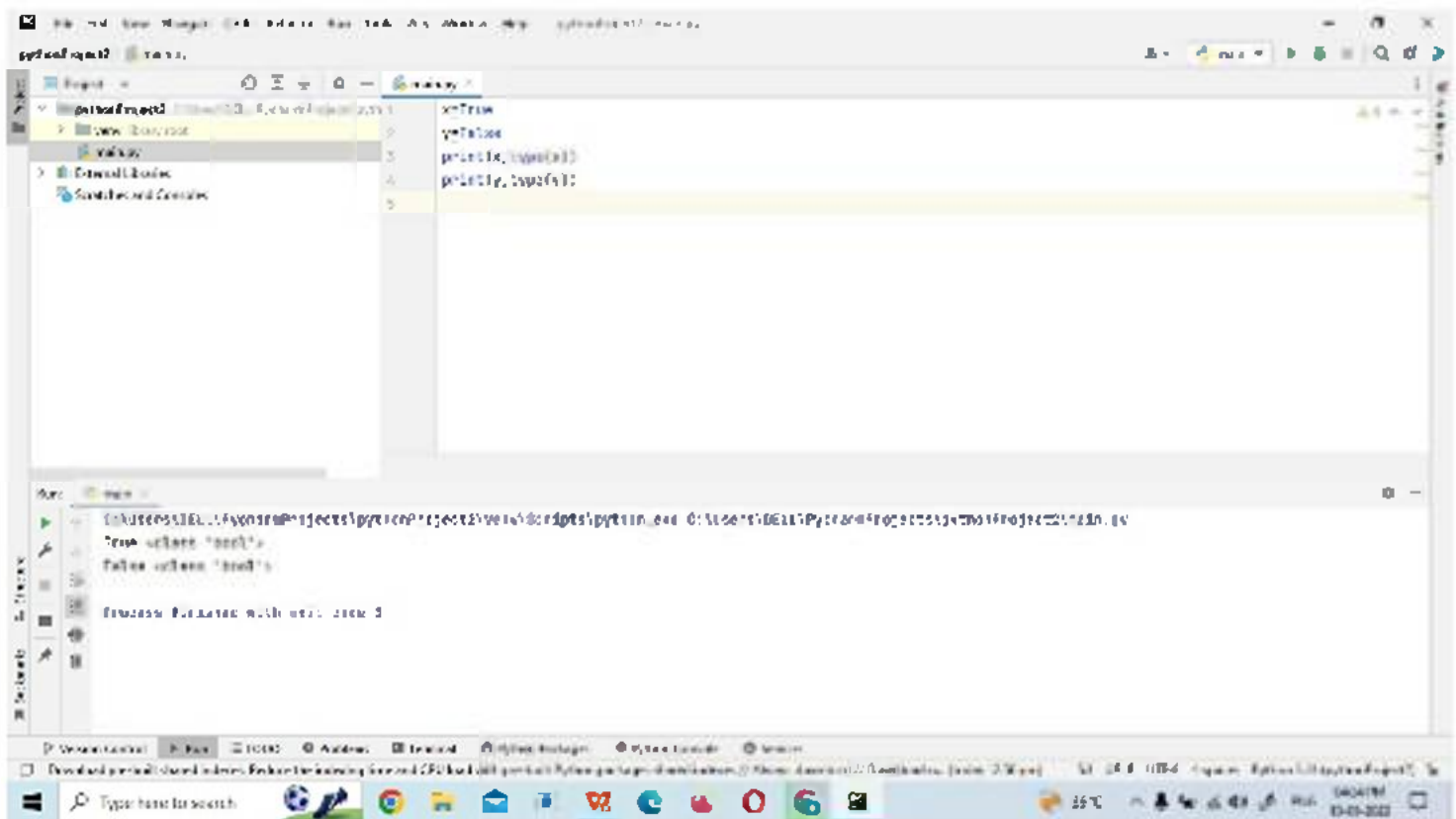
5.2 String data type:

String means a sequence of characters which consists of characters, numbers and special symbols. Which may be represented by using single quote or double quotes. If you want to declare multi line string use triple quote.



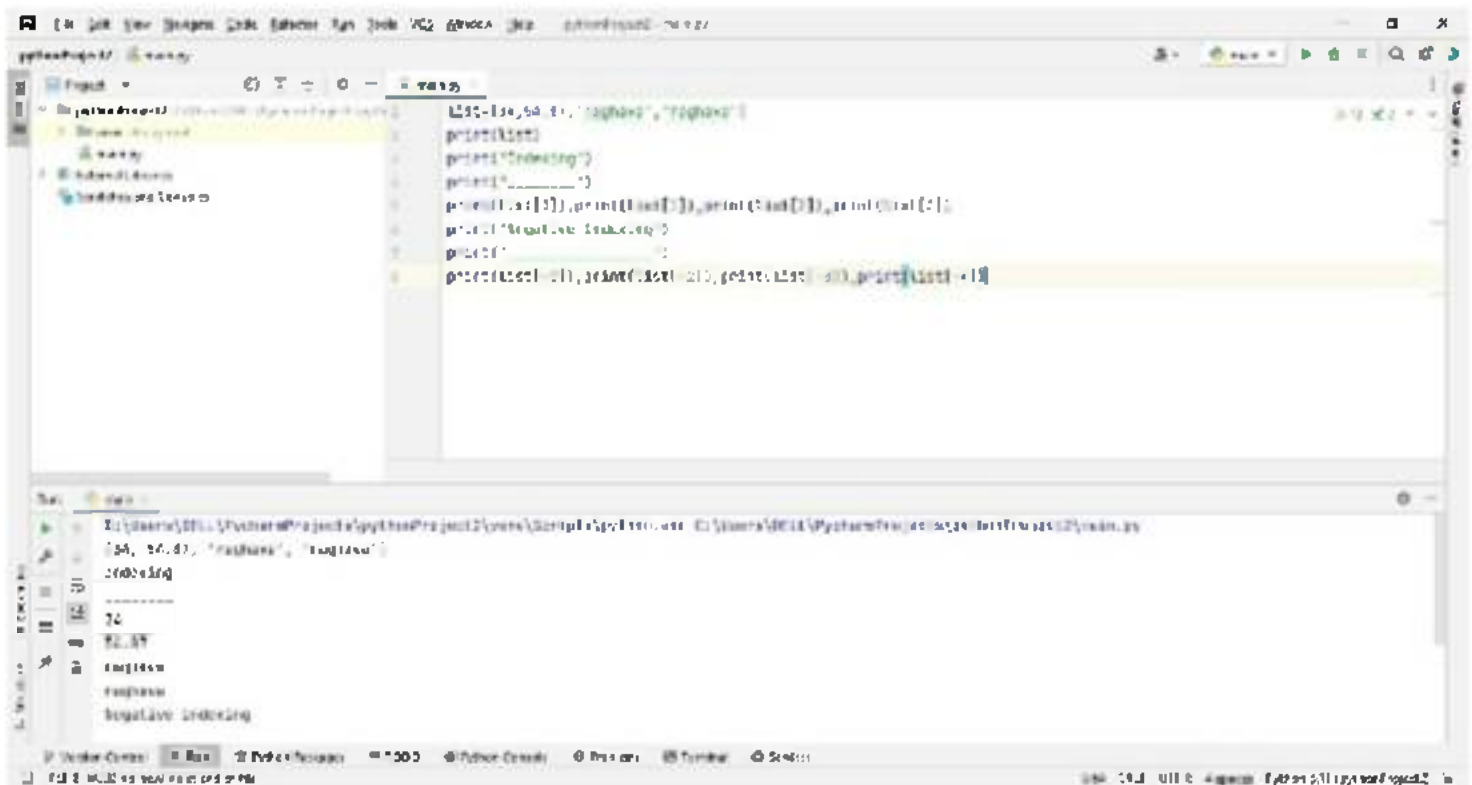
5.3 Boolean Data type:

The simple built in type data type as boolean data type which return as true or false.



5.4 List data type:

List is one of the compound data type, it is collection of different data type elements which is declared in between [] brackets.



The screenshot shows a Python IDE with a file named 'main.py'. The code in the editor is as follows:

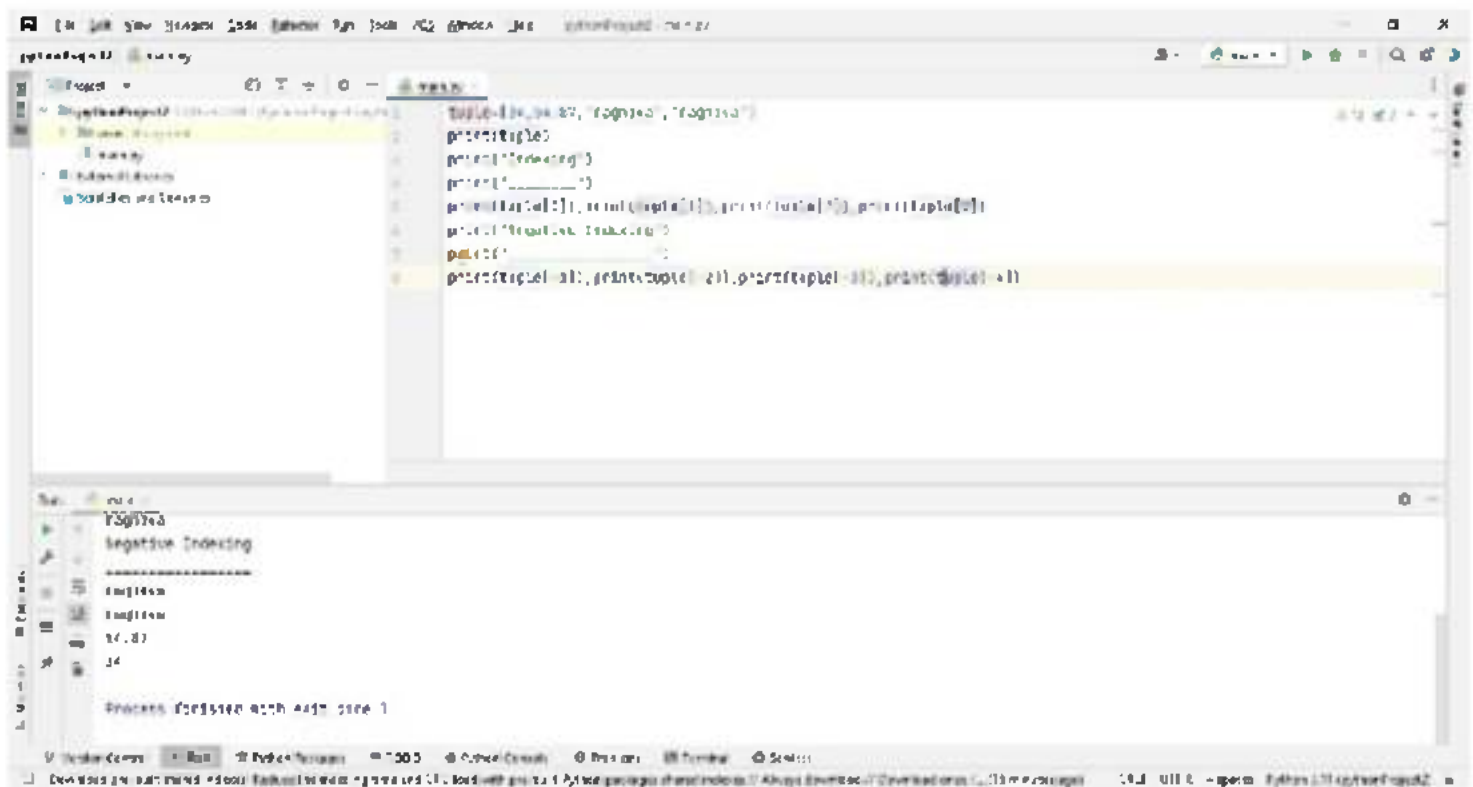
```
l=[10,15,54, 21, "python", "python"]
print(l)
print(l.index(2))
print("_____")
print(l[2]), print(l[1]), print(l[0]), print(l[-1])
print("_____")
print(l.index("python"))
print("_____")
print(l[0], print(l[1]), print(l[2]), print(l[3]), print(l[4])
```

The output window shows the following results:

```
[10, 15, 54, 21, 'python', 'python']
2
_____
21 15 10 python
_____
python
_____
10 15 54 21 python
```

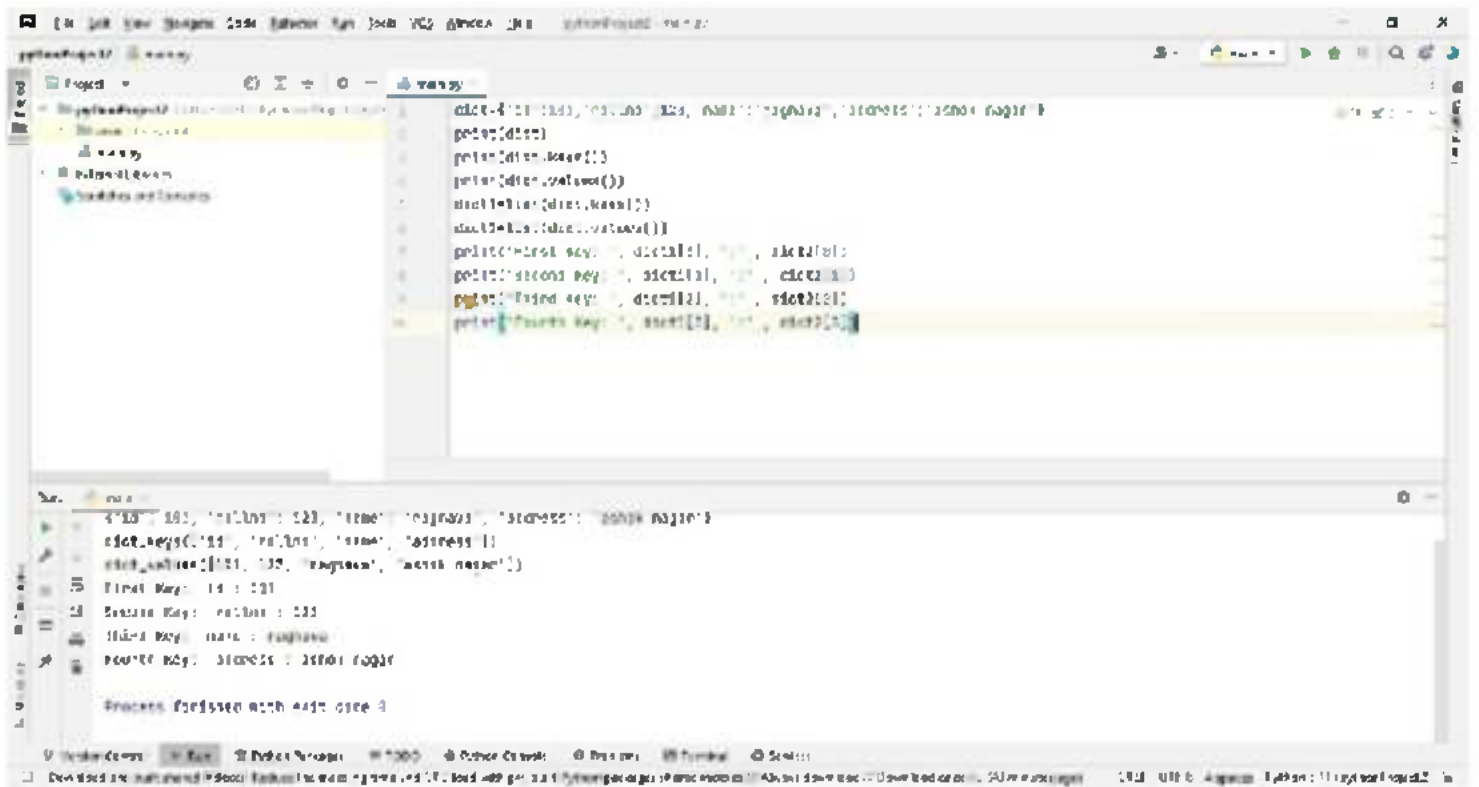
5.5 Tuple data type:

Tuple is another one type of compound data type. Which is also a collection of different data type elements it is declared within () brackets.



5.6 Dictionary data type:

Dictionary is one type of hash table. It consists of key value pairs, which is also a collection of different data type elements mentioned within {} braces. The key and then the corresponding value mentioned in sequence order.



CHAPTER -6

OPERATORS IN PYTHON

Operator is just like a symbol to perform some operations between the two operands. There are so many types of operators mentioned in this chapter:

1. Arithmetic operator
2. Comparison operator

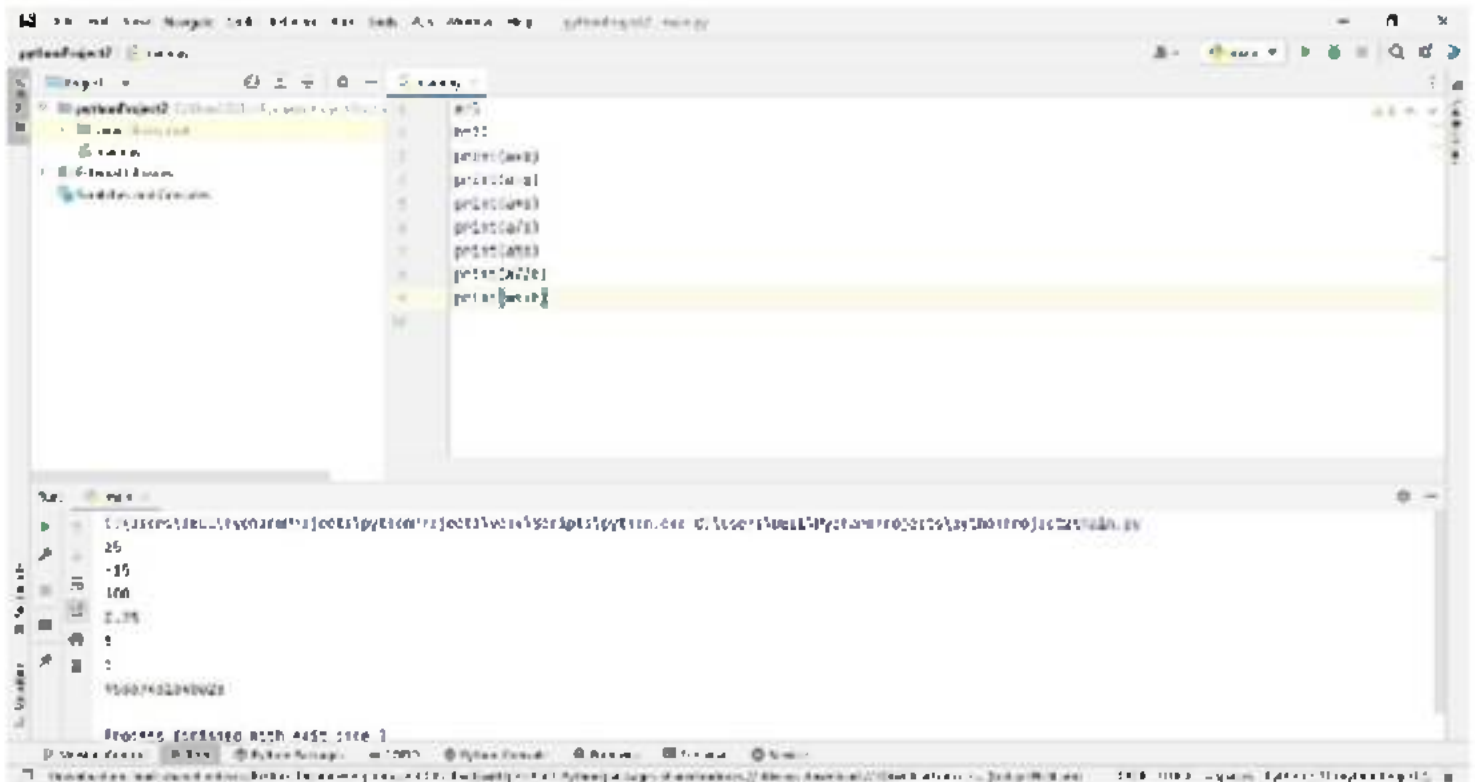
3. Assignment operator
4. Logical operator
5. Bitwise operator
6. Membership operator
7. Identity operator

6.1 Arithmetic Operators:

Arithmetic operations performed between the two operands by using arithmetic operators.

Operator	Operations	Example a=5 b=20
+	Addition operations	>>print(a+b)=25
-	Subtraction operations	>>print(a-b)=-15
*	Multiplication operations	>>print-(a*b)=100
/	Division operations	>>print(a/b)=0.25
%	Modulus operations	>>print(a%b)=5
//	Floor division	>>print(a//

		b)=0
**	exponen- tiation	>>print- (a**b)=95367



6.2 Comparison Operator:

Compare or relation between the values of the operands and return the value as either true or false.

Operator	Operations	Example a=5 b=20
==	Equal operations	>>print(a==b) false
!=	Not equal	>>print(a!=b)

	operations	true
<	Less than operations	>>print(a<b) true
>	Greater than operations	>>print(a>b) false
<=	Less than or equal to operations	>>print-(a<=b) true
>=	Greater than or equal to operations	>>print-(a>=b) False

The screenshot shows a Python IDE with a script named 'main.py' containing the following code:

```

a = 5
b = 10
print(a < b)
print(a > b)
print(a <= b)
print(a >= b)
print(a <= b)
print(a >= b)

```

The console output at the bottom shows the results of these operations:

```

True
False
True
False
True
False

```

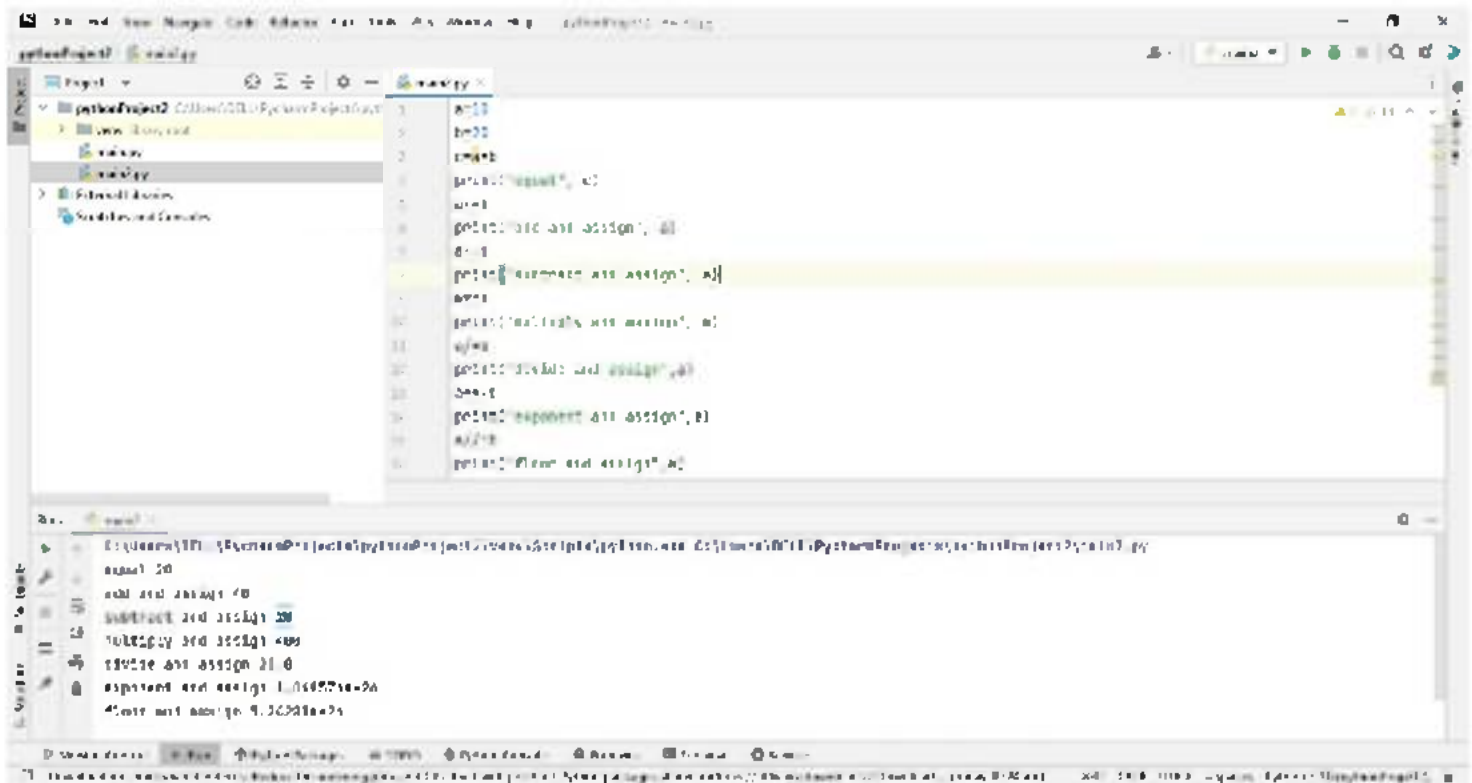
The status bar at the bottom indicates the file path: 'C:\Users\DELL\PycharmProjects\pythonProject2\main.py'.

6.3 Assignment Operators:

The right side of the expression value is assigned to left side operands by using assignment operators.

Operator	Operations	Example a=10 b=20
=	Equal operations	>>print(a=b)
+=	Add and assign operations	>>print(a+=b)
-=	Subtract and assign operations	>>print(a-=b)
=	Multiply and assign operations	>>print(a=b)
/=	Divide and assign operations	>>print(a/=b)
=	Exponent	>>print(ab)

	and assign operations	
//=	Floor and assign	>>print(a// =b)

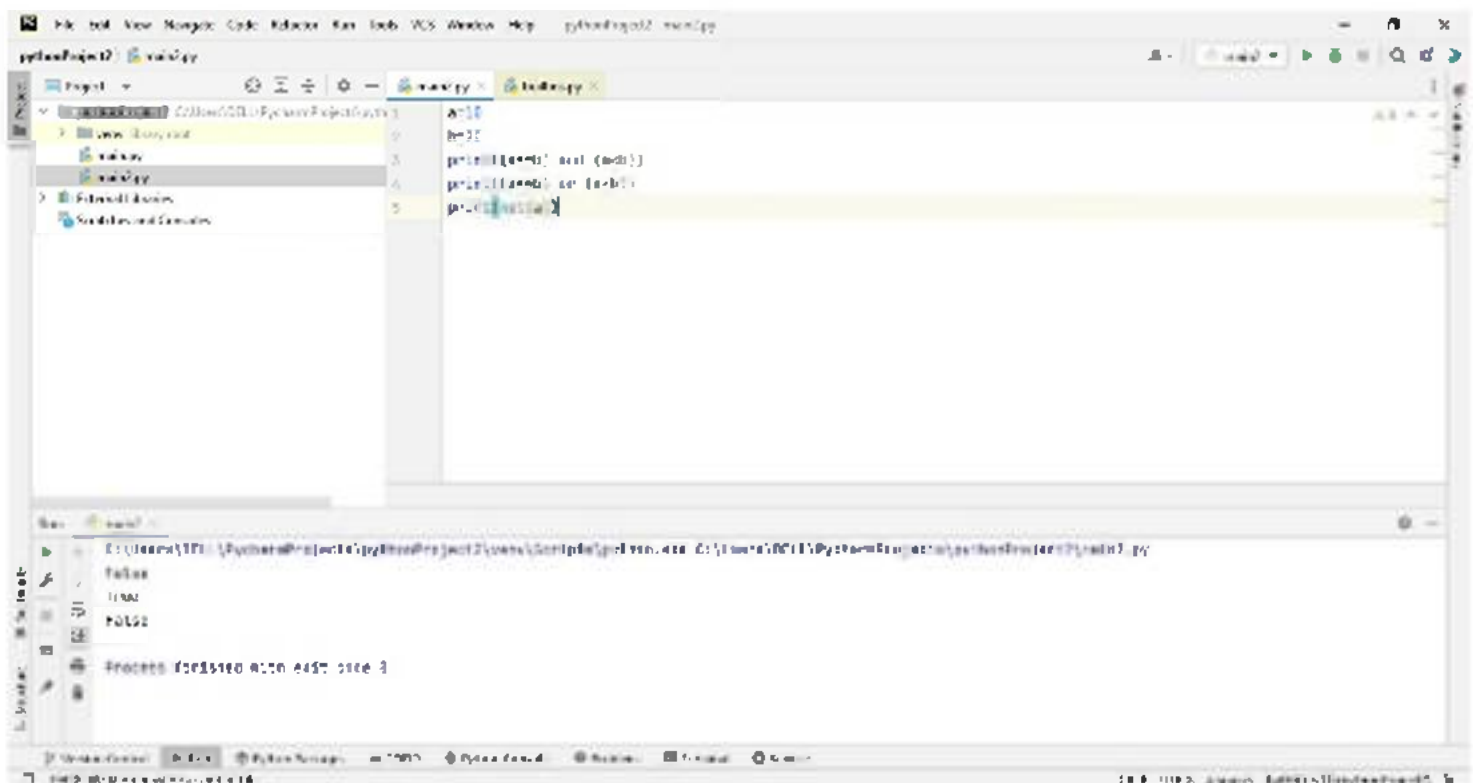


6.4 Logical Operator:

Logical operations are made by using this operator. logical AND, logical OR, logical NOT are the logical operators.

Operator	Operations	Example a=10 b=20
and	Logical and operation	(a=b) and (a<b)

		false
or	Logical or operation	(a<=10) or (a<b) true
not	Logical not operation	Not(a)



6.5 Bitwise Operators:

Bit by bit operations are performed by using bitwise operators.

Operator	Operations	Example a=10 b=20
&	Binary AND	>>print(a&b)

	operations	
	Binary OR operations	>>print(a b)
^	XOR operations	>>print(a^b)
~	Negation operations	>>print(~a)
>>	Left shift operations	>>print(a>>2)
<<	Right shift operations	>>print(a<<2)

```

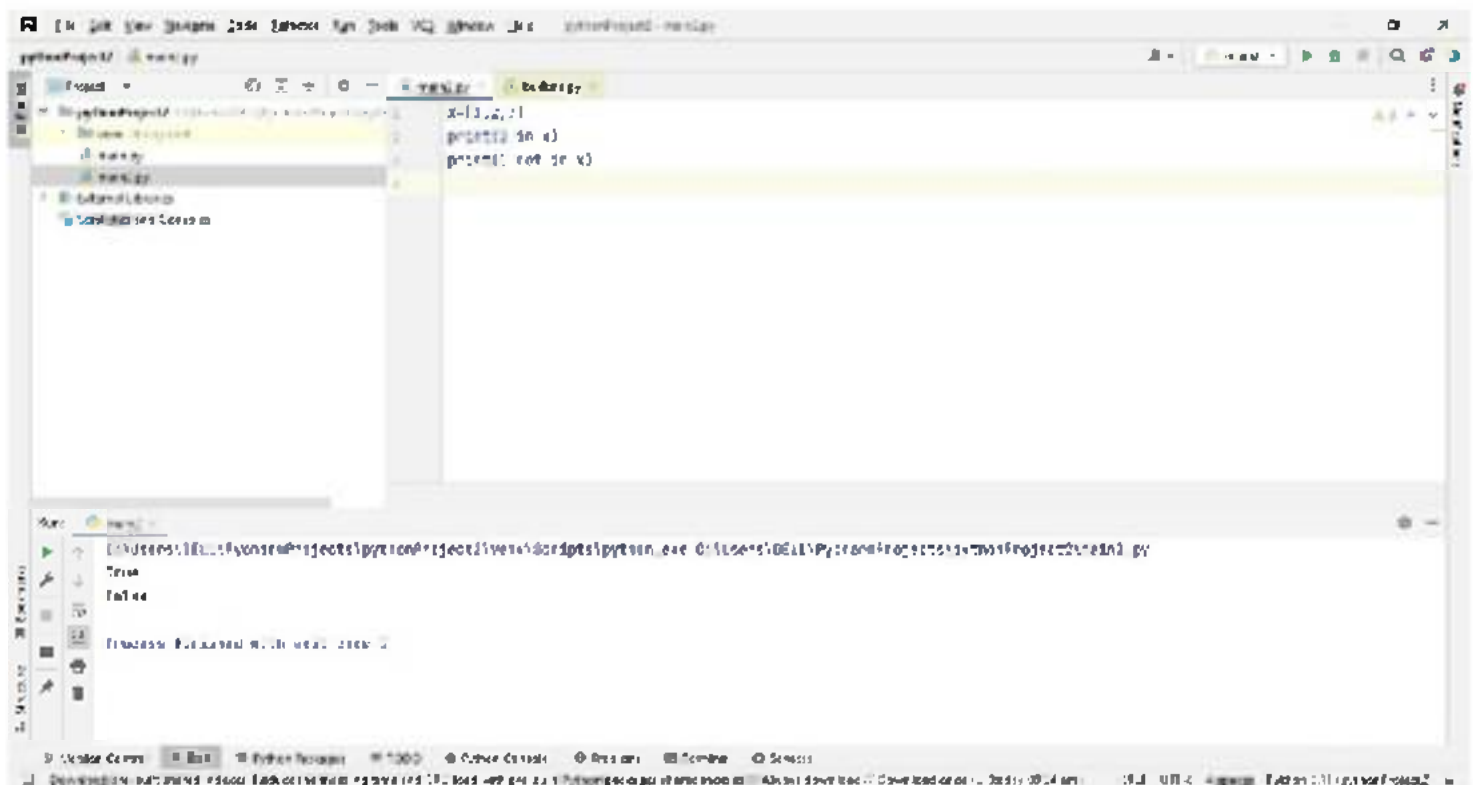
a=4
b=3
print(a|b)
print(a^b)
print(~a)
print(a>>2)
print(a<<2)
print(a|b)
print(a^b)

```

6.6 Membership Operator:

The membership of a value inside a Python data structure can be verified using Python membership operators. The result is true if the value is in the data structure; otherwise, it returns false.

Operator	Operations	Example a=10 b=20
in	In operations	>>print(a&b)
Not in	Not in operations	>>print(a!b)



6.7 Identity Operator:

Check the values of the operands within the set by using the identity operator.

Operator	Operations	Example
-----------------	-------------------	----------------

		x=[1,2,3] y=[5,10,15]
is	Is operations	>>print(x is y)
Is not	Is not operations	>>print(x is not y)

```

x=[1,2,3]
y=[5,10,15]
print(x is y)
print(x is not y)

```

```

C:\Users\1711\Python\Project\python\project2\venv\Scripts\python.exe C:\Users\1711\Python\Project\python\project2\main7.py
False
True
Process finished with exit code 0

```