**Overview of python:**

Python is object oriented programing language

Python dynamic language

Introduced by Guido van Rossum

Python interpreter language means line by line execution

Python have multiple components like function, modules, classes, packages

Features of python:

Python is very easy:

Interpreter language:

Object oriented:

Free and open source:

Portable:

Python supports GUI programing:

Python provides large standard librarye to implement variety of programs

Frames works are Django, flask

Python extends is .py

WHY WE SHOULD LEARN PYTHON?

Developing a web site, game, to machine learning, artificial language, data analystics,

INSTALL ANACONDA?

Go to chrome and type download anaconda python

And follow the predefined options and finish it

Execution program using anaconda:

**PYTHON VARIABLES:**

In python variable is a named location use to store data in the memory

Each variable must have a unique name called identifier

In python variables do not need declaration to reserve memory space.

The variable declaration or variable initialization happens automatically when we assign value to a variable

Ex:

Kount = 100

Emp\_name = ‘basu’

Age1, age2 = 44,32

**CONSTANTS:**

A constant is a type of variable whose value cannot be changes.

It is helpful to think of constants as containers that hold information which cannot be changed later

Naming conventions for variables and constants in python:

Nomenclature should be purpose

Sue camelCase notation

Use capital letters to represent a constant

Symbols like @,#,! Should not be used

Don’t start with a digit

Constants are put into python modules and meant not be changes

Constant and variable names should have combination of letetrs in lowercase or uppercase or digits or an underscore

**CLASS AND OBJECTS:**

Python is an OOP language

Object is simply a collection of data varaibles and methods (functions) that act on those data and class is a blurprint for the object

An object is also called an instance of a class and the process of creating this object is called instantiation

PYTHON ARRAYS:

Arrays are fundamental part of most programing language

It is the collection of elements of a single data type

Array methods:

Appends: to adda element to the end of the list

Extend: to extend all elements of a list to the another list

Insert: to insert an element at the another index

Remove: to remove an element from the list

Pop: to remove elements return element at the given index

Clear: to remove all elements from the list

Index: to return the index of the first matched element

Count: to count of number of elements passed as an argument

Sort: to sort the elements is ascending order by default

Copy: to return a copy of elements in a list

FILE METHODS:

Close: close an open file. It has no effect if the file is already closed

Detach(): separate the underlying binary buffer from the textIObase and return it

Fileno(): return an integer number of the file

Flush: flush thw write buffer of the file stream

Isatty: return true if the file stream is interactive

Read(n): read almost n charecters from the file. Reads till end of the file if it is negative or none

Readble(): returns true is the file stream can be read from

Readlines(n=-1): read and return one line from the file. Reads in a t most n bytes if specified

Seek(offset, from=SEEK\_SET): change the file position to offset bytes in reference to from (start, current, end)

Seekable(): returns true is the file stream supports random access

Tell(): returns the current file location

Truncate(size=N one): resize the file stream to size bytes. If size is not specified resize to current location

Writable: returns true is the file stream can be written to

Write(s): write string to the file and return the number of characters written

Writelines(lines): write a list of lines to the file

Readline(n=.1):read and return one line from the file. Reads in at most n bytes if specified

Readlines(n=.1):read and return a list of lines from the file. Reads in at most n bytes/characters if specified

PYTHIN KEYWORDS AND IDENTIFERS:

Keywords are the reserved words in python

During coding keyowrds cant be used as variable name, function name or any other identifier.

They are use to define the syntax and structure of the python language

Keywords are case sensitive in python

Keywords list:

False, class, finally, is return, None, continue, for ,lambda, try, None, continue, ….etc

PYTHON IDENTIFIERS:

Identifier is nothing but the names given to entities like class, functions, variables etc

It helps us in differentiating one entity from another

RULES FOR WRITING IDENTIFIERS:

Identifiers can be a combination of letters in lowerercase or uppercase or digits or an underscore

Names like myClass1, var\_2 and all are valid example

An identifier cannot start with a digit

Keywords cannot be used as identifiers

We cannot use special symbols like !, @, # $, % etc. in our identifier

PYTHON TUPLES:

Tuple is declared round brackets

Tuple is order data type

Tuple is immutable it cant be modified

Tuple is both homogenous and heterogenous

Tuple allows duplicates

Built in functions with tuple:

All(): return true if all emelents of the tuple are true

Any(): return true if any element of the tuple is true. If the tuple is emoty, return false

Enumerate(): return an enumerate object. It contains the index and value of all the items of tuples as pairs

Len(): return the length in the tuple

Max(): return the largest item in the tuple

Min(): return the smallest item in the tuple

Sorted():take elements in the tuple and return a new sorted list

Sum(): return the sum of all elements in the tuple

Tuple: convert an iterable (list,string, set, dictionary)

PYTHON SETS:

Set

Element sin set is declared using curly brackets{}

Empty set is declared using set () otherwise python will considered as dictionary

It is unordered data type it will not support indexing

It is mutable data type it can be modified

Duplicates are not allowed

Set is both homogenous and heterogenous type but it allows only immutable

Set methods:

add(): add an element to a set

clear(): remove all elements form a set

copy(): returns a shallow copy of a set

Set union:

Set intersection:

Set difference:

PYTHON MODULES:

A python module is a simply a python source file which can expose classes, functions and global variables

When imported from another python source file name is treated as a namespace

A python package is simply a directory of python modules

Ex:

Import numpy

Or

Import numpy as np

PYTHON DIRECTOTREY AND FILE MANAGEMENT?

If there are a large number of files to handle in your python program we can arrange our code within different directories to make things more manageable and reachable

A directory or folder is a collection of or set of files and sub directories

Python has the os module which provides us with many useful methods to work with directories

Directory management in python means creating a directory renaming it listing all directories and working with them

PYTHON DICTIONARY:

Elements in dictionary stored using {} curly brackets

Elements are stored In the form of “key” and “value” pair

Key and value separated by (:) key value pair separated by (,)

Dictionary is order data type

Dictionary is mutable data type it cant be modified

PYTHON NESTED DICTIONARY IMPLEMENTATION:

In python a nested dictionary is a dictionary inside a dictionary.

It’s a collection of dictionaries into one single dictionary

PYTHON STRINGS:

String is nothing but sequence of charecters

String is declared using single quotes(‘ ‘) and double quotes (“ “) and tribble quotes(‘’’ ‘’’)

Single line string is declared using single quotes and double quotes

Multiple line strings is declared using ‘’’ ‘’’ quotes

String is ordered data type

It supports indexing both positive and negative

String is immutable data it cant be modified

FORMAT STRING:

PYTHON DATA TYPE CONVERSION:

The process fof onverting the value of one data type(integer, string, float etc)

To another data type is called conversion

Python has two types of conversion

Implicit conversion

Explicit conversion

PYTHON NUMBERS:

Number data types:

Python supports three number data types

Integer numbers(ex 100)

Floating point numbers(ex: 1.35)

Complex numbers(ex: 3+4j)

We can use the type() function to know which class a variable or a value belongs to and isinstance() function to check if it belongs to a particular class.

While integers can be of any length, a floating point number is accurate only up to 15 decimal places

Numbers we deal with everyday are decimal number system

Python can also express binary, octal and hexa decimal numbers

As computer programmers need to work with binary hexadecimal and octal number systems

In python we can represent these numbers by appropriately placing a prefix before that number

Ob or oB as binary number prefix

0o or o0 as octal number prefix

Ox or 0x hexa decimal number prefix

NUMBER TYPE OCNVERSION

We can also use built in function like

Int()

Float() and

Complex()

To convert between types explicitly these functions can even convert from strings

PYTHON RANDOM

PYTHON NAME SPACE AND SCOPE

In python namespace is a collection of names

Which holds as a mapping of every name, we ave defined, to corresponding objects

Different namespaces can co-exist at a given time but are completely isolated

A name space contaiing all the built in names is created when we start the python interpreter and exists as long we don’t exsit

Modules can have various functions and classes

A alocal namespace is created when a function is called whih has all the names defined in it siiliar is the case with class

PYTHON GLOBAL AND LOCAL AND NON LOCAL VARIABLES:

GLOBAL VARIABLES:a variable which is declared outside of the function or in global scope is known as global variable

This means global variable can be accesed inside or outside of the function

LOCAL VARIABLE:a variable which is declared iside the functions body or in the local scope is known as local variable

Nonlocal variables:non local variables are use in nested function whose scope is not defined

This means the variable can be neither in the local nor the global scope

PYTHON GLOBAL KEYWORD:

In python programs global keyword allows us to modify the variable outside of the current scope

It is used to create a global variable and make changes to the variable in a local context

How to use global keyword:

When we create a variable inside a function its local by default

When we define a variable outside of a function its global by default you don’t have to use global keyword

We sue global keyword to read and write a global variable inside a function

Use of global keyword outside a function has no effect

PYTHON ITERATORES:

Iterators are present in python. They are mostly implemented within for loops comprehensions generators etc. but hidden in plain sight

Iterator in python is simply an object that can be iterated upon.

An object which will return data, one element at a time

Technically speaking python iterator object must implement two special methods, \_iter\_() and \_next\_() , collectively called the iterator protocol

An object is called iterable if we can get an iterator from it most of built in containers in python like list, tuple, string etc are iterable

The iter() function returns an iterator from them

The \_next\_() method must return the next item in the sequence . on reaching the end, and in subsequent calls, it must raise stopiteration

Python iterations using for loop:

The for loop in python to iterate over a sequence (list, tuple, string) or other iterable objects.

Iterating over a sequence is called traversal

The range() function:

We can generate a sequence of numbers using rage() function range(10) will generate numbers from 0 to 9

We can also define the start , stop and step size as range (start, stop, step, size) step size defaults to 1 if not provided

For loop with else section:

A for loop can also have an optional else block

The else part is executed when the items in the sequence used in for loop exhausts

Break statement can be used to stop a for loop in such case, the else part will be ignored

Hence a for loop else part runs if no break occurs

PYTHON INHERITENCE:

It refers to defining a new class with little no modification to an existing class.

The new class is called derived or child class and the one from which it inherits is called the base or parent class

Single inheritance

Multiple inheritance

Hierarchical inheritance

Multilevel inheritance

Hybrid inheritance

Multiple inheritance:

Like c++ a class can derived from more than one base classes in python. This is called multiple inheritance

In multiple inheritance the features of all the base claases are inherited into the derived class.

PYTHON FUNCTIONS:

Function is a group of related statements that perform a soecific task in our program

Function implementation breaks our program into smaller and modular chunks

Functions helps us to make our programs more modular organized and easy to debug

Reusability feature helps us to avoid repetition of our program codes

Syntax:

Def function name(parameters):

“””docstring”””

Statements(s)

Return retrun\_value

Types of functions:

PYTHON FUNCTION ARGUMENTS:

Argument passing to a function is optional

A function may or may not have arguments passed

A function can have fixed or variable number of arguments

Let us discuss variations while passing variable number of arguments

Python default arguments

Python keyword arguments

Python arbitrary arguments

PYTHON BREAK STATEMENT:

In python break and continue statement can alter the flow of a normal loop

Loops iterate over a block of code until test expression is false, but sometimes we wish to terminate the current iteration or even the whole loop without checking test expression

The break and continue statements are used in these cases

SYNTAX:

The break statement terminates the loop containing it

Control of the program flows to the statement immediately after the body of the loop

If break statement is inside a nested loop break will terminate the innermost loop

PYTHON CONTINUE STATEMENT:

The onctinue stamen Is used to skip the rest of the code inside a loop for the current iteration only

Loop does not terminate but continues on with the next iteration

PYTHON ERRORS AND EXCEPTIONS:

When writing a program and executing it we often encounter errors

Error caused by not following the proper structure of the language is called syntax error or parsing error

Ex: if we miss : in the if statement if imports are not proper etc

Python built in exceptions:

Assertion error: raised when assert statement fails

Attribute error: raised when attribute assignment or reference fails

EOFError: raise when the input() functions hits end of file condition

Floating-point error: raise when a generates close() methods called

Generator Exit: Raise when a generators close() method is called

Import Error: raised when the imported module is not found

index Error: raised when index of a sequence is out of range

PYTHON TRY AND EXCEPT AND FINALLY:

Python has many built in exceptions which enables our program to output an error message when something in it goes wrong

When these exceptions occur, it causes the current process to stop and passes it is the calling process until it is handled.

If not handled our program will crash

PYTHON USER DEFINED EXCEPTION:

PYTHON OOPS:

Python has a multi paradigm programing language as it supports different programming approach

One of the popular approaches to solve a programming problem is by creating objects

This is known as object oriented programming

An object has two characteristics:

Attribute or messages

Behaviors or methods

Example:

Dog is an object it has

Name, age, height, weight, cooler are attributes

Barking, wagging, running are behaviors

The concept of OOP in python focuses on creating reusable code.

This concept is also known as DRY(don’t repeat yourself)

In python the basic concept of OOP follows same basic principles

INHERITENCE: a process of using details from a new class without modifying existing class

ENCAPSULATION: hiding the private details of a class from other objects

POLYMORPHISAM: a concept of using common operation in different ways for different data input

PYTHON OPERATOR OVERLOADING:

Python operators work for built in classes.

But same operator behaves differently with different types

For example the + operator will perform arithmetic addition on two numbers, merge two lists and concatenate two strings

This feature in python that allows same operator to have different meaning according to the context is called operator overloading

COMPARISION OPERATOR OVER LOADING:

PYTHON STATEMNTS AND COMMENTS:

Python statement: instructions that a python interpreter can execute are called statements .

For example count=10 is an assignment statement

If statement for statement while statement etc

Multiline statement:

In python end of a statement is marked by a newline character

But we can make a statement extend over multiple lines with the line continuation character(\)

Ex:

Print(‘welcome to \

The world \

Of programming”)

PYTHON INDENTATION:

Like other programming languages ex c, c++, java use braces {} to define a block of code python uses indentation

Ex:

For I in rage(1,10):

For j in range(1,5):

Print(I,j)

PYTHON COMMENTS:

In python we use the hash (#) symbol to start writing a line comment

Ex:

# this is a line comment

MULTILINE COMMENTS:

If we have comments that extend multiple lines, one way of doing it is to use hash (#) in the beginning of each line

Ex:

# in this program we have

# used functions and

# iterations

Another way of doing this is use trple quotes, either “or”””

These triple quotes are generally used for multi line strings

But they can be used as multi line comments as well

Unless they are not docstrings they do not generate any extra code

Ex:

‘’’ this is a

Multiline commnet’’’

DOCSTRING IN PYTHON:

Docstring is short for documentation string

It is a string that occurs as the first statement in a module, function, class, or method definition

We must write what a function/class does in the docstring

PYTHON PASS:

In python programming pas is a null statement

The difference between a comment and pass statement in python is that whilw the interpreter ignores a comment entirely pass is not ignored

However nothing happens when pass is executed it results into no operation

We generally use it as a placeholder

PYTHON GENERATORS:

Iterators in python incur lots of overheads

Implementing a class with \_\_iter\_\_ and \_\_next\_\_ () method, then keeping track of internal states, raise stop iteration when there was no values to be returned etc

This is both lengthy and counter intuitive. Generator comes with more simplicities

Python generators are a simple way of creating iterators

All the overhead we mentioned above are automatically handled by generators in python

Simply speaking a generator is a function that returns an object iterator which we can iterate over

DIFFRENCE BETWEEN NORMAL FUNCTION AND GENERATOR FUHNCTION:

Generator function contains a one or more yield statement

When called it returns an object but does not start execution immediately

Methods like \_\_iter\_\_() and \_\_next\_\_() are implemented automatically.

So we can iterate through the items using next()

Once the function yields the function is paused and the control is transferred to the caller

Local variables and their states are remembered between successive calls

Finally when the function terminates stop iteration is raised automatically on further calls

PYTHON DECORATORS

Python has as additional and integrating feature called decorators to add functionality to an existing code

This is also called metaprogramming as a part of the program tries to modify another part of the program at compile time

PYTHON WHILE LOOP:

The while loop in python is use to iterate over a block of code as long as the test expression is true

We generally use this loop when don’t know beforehand the number of times to iterate

PYTHON REGULAR EXPREESIONS

Regular expressions allow you to locate and change

Strings in very powerful ways

They work in almost exactly the same way in every

Programming language as well

Regular expressions are used to search for a specific string a large amount of data

Verify that a string has the proper format(email, phone)

Find a string and replace it with another string

Format data into the proper from for importing

PYTHON LIST COMPREHENSION:

PYTHON RECURSION:

The process in which a function calls itself directly or in directly is called recursion and the corresponding function is called as recursive function

Using recursive algorithm certain problems can be solved quite easily

In recursion there will be base cases in base cases for certain inputs and outputs will remain known to us

Python supports recursion

ADVANTAGES OF RECURSION:

Recursive functions make the code look clean and elegant

A complex task can be broken down into simpler sub problems using recursion

Sequence generation is easier with recursion than using some nested iteration

DISADVANTAGSE OF RECURSION:

Sometimes the logic behind recursion is hard to follow through

Recursive calls are expensive as they take up a lot of memory and time

Recursive functions are hard to debug

PYTHON INPUIT AND OUTPUT AND IMPORT:

Some of the functions like input() and print() are widely used for standard input and output operations respectively

When our program grows bigger it is a good idea to break it into different modules

For the ease of program development, definitions inside a module can be imported to another module or the interactive interpreter in python we use the import keyword to do this

READ AND WRITE OPERATIONS IN PYTHON

File is a logical unit of related information stored on a name’s location on disk

It is used to permanently store data in a nonvolatile memory

Since random access memory is volatile so it can’t be treated for permanent storage of data

When we want tot read from or write to a file, we need to open it first

When we are done it needs to be closed so that resources that are tied with the file are freed

Hence in python a file operation takes place in the following sequence

Open a file

Read or write

Close the file

r- open a file for reading

w- open a file for writing creates a new file it does not exists the operation fails

x- open a file for exclusive creation if the file already exists the operation fails

a-open for appending at the end of the file without truncating it.it creates a new file if it does not exist

t-open in text mode

b-open in binary mode

+-open a file for uploading (reading and writing)

CLOSING A FILE IN PYTHON:

When we are done with operations to the file we need to properly close the file

Closing a file will free up the resources that were tied with the file and is done using python close() method

Python has a garbage collector to clean up unreferenced objects but we must not rely o nit to close the file

INFINATE LOOP IN PYTHON:

We can create an infinite loop using statement

If the condition of while loop is always we get an infinite loop

PYTHON SHALLOW COPY AND DEEP COPY:

PYTHON LAMBDA FUNCTIONS:

PYTHON FILTER:

PYTHON MAP:

PYTHON ASSERT:

Assertions are statements that assert or state a fact confidently in our program

For example while writing a division function we are confident the divisor should not be zero we assert divisor is not equal to zero

Assertions are simply Boolean expressions that checks if the conditions return or not

If it is true the program does nothing and move to the next line of code

However if its false the program stops and throws an error

It is also debugging tool as it brings program on halt as soon as any error is occurred and shows on which point of the program error has occurred

PYTHON CLOSURE:

A closure is a function object that remembers values in enclosing scopes even if they are not present in memory

PYTHON \_\_INIT\_\_

PYTHON SELF: