

# Python Lessons

## Introduction:

- ✓ Python is a popular programming language.
- ✓ It was created by “Guido Van Rossum”.
- ✓ Python programming language was released in year 1991.
- ✓ It is used for: web development, software development, mathematics and system scripting.

## Uses:

- ✓ Python can be used with Database Systems.
- ✓ Python can also read and modify files.
- ✓ Python can be used to handle big data and perform complex mathematics.
- ✓ Python can be used for repaid prototyping or for production ready software development.
- ✓ Python can be used alongside software to create workflows.
- ✓ Python can be use on server side to create web applications.

## Why to Choose Python:

- ✓ Python works on many platforms. Like Windows, Mac and Linux.
- ✓ Python has a simple syntax similar to English language.
- ✓ Python executes on interpreter system, it means that code be executed as they have been written.
- ✓ Python has syntax that allows developers to write the program with fewer lines than some other programming languages.
- ✓ Python can be treated in procedural way, an object oriented way and or a functional way.
- ✓ It is possible to write python code by using Integrated Development Environment (IDE).
- ✓ Some of the popular Python IDEs are: [PyCharm](#), [Eclipse](#) and [Netbeans](#).
- ✓ Python was designed for readability, and has some similarities to the English language with influence from mathematics.
- ✓ Python relies on indentations, using white-space to define scope such as scope of loops, functions and classes, other programming languages often use curly brackets for this purpose.
- ✓ Python uses new line to complete a command as opposed to other programming languages which often use semicolons or parentheses.

## Python Syntax:

- ✓ Python syntax can be executed by writing directly in the command line.
- ✓ Python syntax can also be executed by creating a python file on the server.
- ✓ Using the \*.py extension and executing on the command line.
- ✓ Indentation refers to the spaces at the beginning of the code line.
- ✓ In other programming languages the indentation in code is for readability purpose.
- ✓ The indentation in python is very important.
- ✓ Python uses indentation to indicate a block of code.
- ✓ Python will display an error if you forgot the indentation in the block of code.
- ✓ The number of spaces has to be at least one space.
- ✓ You have to use same number of spaces in the same block of code otherwise python will give you an error.

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## **Python Variables:**

- ✓ Variables are created when you assign a value to it.
- ✓ Python has no command for declaring a variable.
- ✓ Variables scope in python is “variable is available in and out within the same region in which it is created”.
- ✓ A variable when it is created inside a function is called a local variable and is only present in the function.
- ✓ Global variables in python is defined outside of any function, but can be used inside of any function.
- ✓ You can also define a global variable inside the function by using the keyword global inside and before the variable name.
- ✓ It will be better if you use global variable inside a function just first use global name before the variable name.

## **Python Comments:**

- ✓ Python comments starts with (#) symbol.
- ✓ After (#) symbol every line of code will be turned into python comments.
- ✓ Python has commenting capability for the purpose of in-code documentation.
- ✓ Comments can be used to explain Python code.
- ✓ Comments can be used to make the code more readable.
- ✓ Comments can be used to prevent execution when testing code.
- ✓ Comments can be placed at the end of a line, and Python will ignore the rest of the line.
- ✓ A comment does not have to be text that explains the code, it can also be used to prevent Python from executing code.
- ✓ Python does not have really a syntax for multi-line comments.
- ✓ To add a multi line comment you could insert a (#) hash for each line.
- ✓ You can also use multiline string.
- ✓ Python will ignore string literals that are not assigned to string variables.
- ✓ You can add a multiline string (""") triple quotes in your code.
- ✓ As long as the string is not assigned to a variable, Python will read the code, but then ignore it, you have made a multiline comment.

## **Python Variables:**

- ✓ Variables are containers for storing data values.
- ✓ Python has no command for declaring a variable.
- ✓ A variable is created the moment you first assign a value to it.
- ✓ Variables do not need to be declared with any particular type and can even change after they have been set.
- ✓ If you want to specify the data type of a variable this can be done with casting.
- ✓ You can get the type of the variable with the type() function.
- ✓ String variables can be declared either by using single or double quotes.
- ✓ Variables name are case-sensitive.
- ✓ The variables can have short names (like x or y) or can have descriptive name (like Age and Gender).

## **Rules for Python Variables:**

- ✓ A variable name must starts with a letter or the underscore character.
- ✓ A variable name cannot start with a number.

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- ✓ A variable name can only contain alpha-numeric characters and underscores.
- ✓ Variable name are case-sensitive. Age and AGE are different variables.
- ✓ Variables name with more than one word can be difficult to read. There are several techniques you can use to make them more readable.
- ✓ Camel Case: Each Word, except the first, starts with the capital letter.
- ✓ Pascal Case: Each word starts with capital letter.
- ✓ Snake Case: Each word is separated by an underscore character.
- ✓ Python allows you to assign values to multiple variables in one line. Make sure the number of variables matches the number of values, or else you will get an error.
- ✓ You can also assign single same value to multiple variables.
- ✓ If you have a collection of values in a list, tuple etc. Python allows you to extract the values into variables. This is called unpacking.
- ✓ The Python print statement is often used to output variables.
- ✓ To combine text and variables Python uses (+) plus operator.
- ✓ You can also use (+) plus operator to add a variable to another variable.
- ✓ For numbers in Python (+) plus operator will work as a addition operator.
- ✓ Variables that are created outside of a function are known as global variables.
- ✓ Global variables can be used by anyone both inside of a function or outside of it.
- ✓ If you create a variables inside of a function then it scope will be local, and hence it will be called local variable.
- ✓ To create a global variable inside a function you can use the global keyword.
- ✓ Also use the global keyword if you want to change a global variable inside a function.

## Python Data Types:

- ✓ Built-in Data Types:
- ✓ In programming, data type is an important concept.
- ✓ Variables can store data of different types and different type can do different things.
- ✓ Python has the following data types built-in by default in these categories.
- ✓ Text Type: str()
- ✓ Numeric types: int(), float(), complex()
- ✓ Sequence types: list, tuple and range.
- ✓ Mapping type: dict.
- ✓ Set types: set, frozenset
- ✓ Boolean type: bool
- ✓ Binary types: bytes, bytearray and memoryview
- ✓ You can get the data type of any object by using the type() function.
- ✓ In Python, the data type is set when you assign a value to a variable.
- ✓ If you want to specify the data type you can use the constructor of the specified data type.

## Pythons Numbers:

- ✓ There are three types of numerics are there:
- ✓ Int.
- ✓ Float.
- ✓ Complex.
- ✓ Variables of numerics are created when you assign a value to them.
- ✓ To verify the type of an object in Python, use the type() function.
- ✓ Int or Integer, is a whole number positive or negative without decimals of unlimited length.

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- ✓ Float or Floating Point Number is a number, positive or negative, containing one or more decimals.
- ✓ Float can also be a scientific numbers with an “e” to indicate the power of 10.
- ✓ Complex numbers are written with a “j” as the imaginary part.
- ✓ You can convert from one type to another with the int(), float() and complex() methods.
- ✓ You cannot convert complex data type variable to another data type variable.
- ✓ Python has a built-in module called random that can be used to make random numbers.
- ✓ Python is an Object Oriented Language, and as such it uses classes to define data types including its primitive types.
- ✓ Casting in Python is therefore is done using constructor functions. Inf(), float(), complex() and str().

## Python Strings:

- ✓ Strings in Python are surrounded by either single quotation marks or double quotations mark.
- ✓ You can display a string literal with the print() function.
- ✓ Assigning a string to a variable is done with the variable name followed by an equal sign and the string.
- ✓ You can assign a multiline string by using the three quotations marks.
- ✓ Like many other programming languages strings in Python, are arrays of bytes representing unicode characters.
- ✓ Python does not have a character data type, a single character is simply a string with a length of one.
- ✓ Square brackets can be used to access elements of the String.
- ✓ Strings are arrays, we can loop through characters in a string.
- ✓ To get the length of the string, use len() function.
- ✓ To check if a certain phrase or character is present in s string, we can use in keyword.
- ✓ To check if a certain phrase or a character is not present in a string, we can use the keyword not in.
- ✓ You can return a range of characters by using the slice syntax. Just specify the start index and the end index, which will be separated by a colon to return a part of the string.
- ✓ By leaving out the start index the range will start at the first character.
- ✓ By leaving out the end index, the range will go to the end.
- ✓ Use the neagative indexes to start the slice from the end of the string.
- ✓ Python has a set of built-in methods that you can use on string.
- ✓ The lower() method returns the string in lower case.
- ✓ The upper() method returns the string in upper case.
- ✓ White-space is the space before and or after the actual text and very often you want it to remove this white-space.
- ✓ The strip() methods removes any white-space from the beginning or the end.
- ✓ The split() method returns a list where the text between the specified separator becomes the list items.
- ✓ To concatenate or combine two strings you can use the (+) plus operators.
- ✓ We can combine strings and numbers by using format() method.
- ✓ The format() method takes the passed arguments, format them, and places them in the string where the placeholders {} are presents.
- ✓ The format() methods takes unlimited arguments and are placed into the respective placeholders.

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- ✓ You can use index numbers {0} to be sure the arguments are placed in the correct placeholder.
- ✓ To insert characters that are illegal in a string, use an escape character.
- ✓ An escape character is a backslash \ followed by the character you want to insert.
- ✓ An example of illegal character is double quote inside the string that is surrounded by double quotes.
- ✓ You will get an error if you use double quotes inside a string that is surrounded by double quotes. To fix this problem use the escape character \".
- ✓ Other characters we can use are:
- ✓ Single Quote.
- ✓ Backslash.
- ✓ New line.
- ✓ Carriage Return.
- ✓ Tab.
- ✓ Backspace
- ✓ Form Feed.
- ✓ Octal value.
- ✓ Hexa Value.
- ✓ Python has a set of string method built-in method that you can use on string.
- ✓ All string methods returns new value. They do not change the original string.
- ✓ Format() method is used in case to display text string correctly.
- ✓ Sometimes strings cannot be parsed correctly. To overcome this issue we will use format() method.
- ✓ Use pair of curly brackets in a string to place formatted string. After that use string.format() method and place special value as parameter.
- ✓ You can also use the index number inside the curly brackets to be sure that formatting will be placed in the correct order.
- ✓ In case of repeated formatting you the same index number inside the pair of curly brackets.
- ✓ For the same you can use names inside the pair of curly brackets to be used instead of indexes, but when you do this you have to use variable name to assign the values to them.

## **Python Booleans:**

- ✓ Boolean represents one of two values: True or False.
- ✓ In programming you often need to know if an expression is True or False.
- ✓ You can evaluate any expression in Python, and get one of two answers: True or False.
- ✓ When you compare two values, the expression is evaluated and Python returns the Boolean answer.
- ✓ When you run a condition in an if statement, Python returns True or False.
- ✓ The bool() function allows you to evaluate any value, and give you True or False in return.
- ✓ Almost any value is evaluated to True if it has some sort of content.
- ✓ Any string, is True except an empty string.
- ✓ Any number is True, except 0.
- ✓ Any List, Tuple, Set and Dictionary are True except empty one.
- ✓ Python has also many built-in functions that return a boolean value like the isinstance() function which can be used to determine if an object is of a certain data type.

## **Python Operators:**

- ✓ Operators are used to perform operations on variables and values.

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- ✓ Python divides the operators in the following groups.
- ✓ Arithmetic Operators.
- ✓ Assignment Operator.
- ✓ Comparison Operators.
- ✓ Logical Operators.
- ✓ Identity Operators.
- ✓ Membership Operators.
- ✓ Bitwise Operators.

## **Python Arithmetic Operators:**

- ✓ Arithmetic operators are used with numeric values to perform common mathematical operations.
- ✓ Arithmetic Operators are:
- ✓ Addition (+).
- ✓ Subtraction (-).
- ✓ Multiplication (\*).
- ✓ Division (/).
- ✓ Modulus (%).
- ✓ Exponential (\*\*).
- ✓ Floor Division (/).

## **Python Assignment Operator:**

- ✓ Assignment operator are used to assign values to variables.
- ✓ Assignment operators are:
- ✓ Equal-to operator (=).
- ✓ (+=).
- ✓ (-=).
- ✓ (\*=).
- ✓ (/=).
- ✓ (&=).
- ✓ (//=).
- ✓ (\*\*=).
- ✓ (&=).
- ✓ (|=).
- ✓ (^=).
- ✓ (>>=).
- ✓ (<<=).

## **Python Comparison Operator:**

- ✓ Comparison operators are used to compare two values.
- ✓ Comparison operators are:
- ✓ Equal (==).
- ✓ Not Equal (!=).
- ✓ Greater Than (>).
- ✓ Less Than (<).
- ✓ Greater Than Equal To (>=).
- ✓ Less Than Equal-to (<=).

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## **Python Logical Operators:**

- ✓ Logical operators are used to combine conditional statements.
- ✓ Logical Operators are:
- ✓ and.
- ✓ Or
- ✓ not

## **Python Identity Operators:**

- ✓ Identity operators are used to compare the objects, not if they are equal, but if they are actually the same object, with same memory location.
- ✓ Identity Operators are:
- ✓ is.
- ✓ is not.

## **Python Membership Operator.**

- ✓ Membership operators are used to test if a sequence is present in an object.
- ✓ in.
- ✓ not in.

## **Python Bitwise Operator:**

- ✓ Bitwise operator is used to compare binary numbers.
- ✓ Bitwise operators are:
- ✓ Bit and (&)
- ✓ Bit or (|)
- ✓ Bit not (~)
- ✓ Bit xor (^)
- ✓ Zero Fill Left Shift (<<).
- ✓ Zero Fill Right Shift (>>).

## **Python Lists:**

- ✓ Lists are used to store multiple items in a single variable.
- ✓ Lists are one of four built-in data types in Python used to store collections of data, the other three are Tuple, Set and Dictionary, all with different qualities and usage.
- ✓ Lists are created using square brackets.
- ✓ Lists items are ordered, changeable and allow duplicate values.
- ✓ List items are indexed, the first item has index [0], the second item has index [1] etc.
- ✓ Lists items can be ordered and cannot be changed because list items have a defined order.
- ✓ If you add new items to the list, the new item will be placed at the end of the list.
- ✓ There are some list methods, that will change the order but in general, the order of the items will not change.
- ✓ Lists in python are changeable, we can add, edit and even remove an item from the list after it was created.
- ✓ To get the list items count use the len() method.
- ✓ List items can be of any data type.
- ✓ Lists are defined as object with the data type "list"

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- ✓ It is also possible to use the `list()` constructor when creating a new list.

## Python Collections:

- ✓ Python Programming Language has four (4) collections data types. They are:
- ✓ List: Lists are ordered, changeable and can contain duplicate values.
- ✓ Tuple: Tuple are ordered but unchangeable and allows duplicate values.
- ✓ Set: Set are unordered and unindexed and cannot have duplicate values.
- ✓ Dictionary: Dictionary is ordered, changeable and cannot have duplicated values.
- ✓ As of Python version 3.7, dictionaries are ordered.
- ✓ In Python version 3.6, dictionaries are unordered.
- ✓ List Items are indexed and accessed by an index number. The first item has index 0.
- ✓ Negative indexing means start from the end. -1 refers to the last item, -2 refers to the second last item.
- ✓ Range can be specified by specifying start and end ranges, Python will return a new list within the defined ranges.
- ✓ Check the specified item in list you have to used in keyword.
- ✓ To change the value of a specific index, just mention that index in square brackets and then assign new value to that index.
- ✓ If you want to change some list items that create a new list with the specific index ranges.
- ✓ If you add more value to the specified index range then additional values will be added after range value and previous value will be moved further.
- ✓ The length of list will be changed when the number of items is greater than the specified after changing some items.
- ✓ The `insert()` method will insert new item at the specified index of the list.
- ✓ The `append()` method will add new value to the end of the list. Aka new index will be created.
- ✓ To merge one list into another list you can use `extend()` method for that purpose. Elements will be added to the end of the extending list.
- ✓ The `extend()` method can handle any iterable object like, Set, List, Dictionary and Tuple.
- ✓ To remove an item from list you can use `remove()` method. This method will remove a specified item.
- ✓ The `pop()` method will remove the specified index from the list. If you forget to specify the index number, the the method `pop()` will remove the last index from the list.
- ✓ You can use `del` keyword to perform the same operation like `pop()` method does. `Del` keyword can also format the list completely.
- ✓ The `clear()` method will clear all the elements from the list, no items will be left after `clear()` method executed.
- ✓ You can loop the list by using `for` loop. You can use `range()` and `len()` function to loop through index number.
- ✓ You can also use `while` loop to iterate the list.
- ✓ List Object have a `sort()` method, which sorts the list in alphabetically.
- ✓ To sort in reverse pass the parameter `reverse` with value `true` in `sort()` method.
- ✓ You can also customise the `sort()` funtion with you own function, simply use key parameter with you r function in `sort()` method. Then `sort()` method with execute used defined function with the implementation for sorting.
- ✓ `Sort()` method is case-sensitive by default. We can use functions as key to `sort()` method. Before sorting.
- ✓ `Reverse()` method will reverse the sorting from default ordering.



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- ✓ To copy a list into another list you have two methods to use without these methods list b will be the reference of list a. these methods are: 1) copy() built-in method of list and 2) list() method of a list.
- ✓ To join two or more lists together, there are many methods. First you can simply use the concatenation(+) to concatenate two or more lists. Another method for the same is to use append() method of list a on list b. you can also use the extend() method of the same purpose.

## **Python File Handling:**

- ✓ File handling is an important part of any web application.
- ✓ Python has several functions for creating, reading, updating and deleting files.
- ✓ Open() function is the most commonly used function in Python language for files.
- ✓ Open() function requires two parameters which are filename and writing mode.
- ✓ The four types of modes for files are:
- ✓ r: open a file for reading purpose only. It also return an error if file does not exist.
- ✓ X: create a new file if it does not exist, error if already exist.
- ✓ A: update the file if exist and if not, it will create a new file and then update the file.
- ✓ W: write to a file if it exist or create a new file.
- ✓ T: text mode it is used in binary mode.
- ✓ B: images in binary mode.
- ✓ If you just want to read a file then only filename is efficient for reading purposes only.
- ✓ File should be present on the same folder as python file are on, or you have to specify the full file path to be read.
- ✓ Open() function returns the file object which contain read() method for reading.
- ✓ You can also pass number of paragraphs to be read as the parameter to the read() method.
- ✓ There is another function which read only first line in the file, this function is readline().
- ✓ Loop through the file to read file line by line by readline() method.
- ✓ Close() function closes any opened file, it is good practice to close the opened file.
- ✓ Closing a file is important because in buffering, the changes you have made into the file cannot be appeared if file is not closed.
- ✓ You can write to a file if you use a or w mode in open() method. A mode will append to the next line while w will overwrite the file.
- ✓ To remove a file you have to import the os module and the the remove() method from that module.
- ✓ You can also remove the entire empty folder by using rmdir() method of the os module.

## **List Comprehension:**

- ✓ List comprehension provides a shorter syntax if you want a new list among a given list. Without list comprehension you have to write for loop with condition statement inside.

## **Python Tuple:**

- ✓ A tuple is a collection in python language, which is ordered and unchangeable.
- ✓ Tuple is just like list and is used to store multiple values in a single variable.
- ✓ Tuple uses round brackets.
- ✓ Tuple are numbered indexed and allow duplicate values. Index always starts with 0.
- ✓ We cannot change or extend the tuple after it is created, hence unchangeable.
- ✓ Tuple also contain duplicate or repeated values.
- ✓ To know the items in a tuple you can use len() method.

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- ✓ If you want a tuple with only one item. Use a comma after the value to save variable as a tuple. Otherwise you will define a string variable.
- ✓ Value in a tuple can be of any type.
- ✓ Single tuple can also contain values with multiple data-types.
- ✓ Tuples can be constructed by using tuple() constructor. Remember to use double round brackets to define the sequence.
- ✓ Use square brackets whenever you want to extract single value from tuple.
- ✓ Negative indexes works in reverse in python collections.
- ✓ Tuples are unchangeable by default but you can achieve this by converting it into list then change the desired value and then convert back it in tuple. You will need list() and tuple() constructors for this.
- ✓ Del keyword will completely empty the tuple.
- ✓ Packing may be define as declaring a variable as a tuple.
- ✓ Unpacking may be defined as assigning variables to tuple.
- ✓ Variables must match with the tuple index, otherwise you have to use \* asterisk to collect the remaining value for the tuple as a list.
- ✓ Count() method can be used in tuples which returns the number of times an item conflicts.
- ✓ Index() method which will return the index number of the specified element.

## Python Set:

- ✓ Set is a different type of variable in python. Set is used to store multiple values under the umbrella of a single variable name.
- ✓ Set is the collection in python which is unordered and unindex and doesn't allow duplicate values by nature. Set uses curly brackets to define a variable as a set.
- ✓ Set are unordered means that you cannot be sure which have which index.
- ✓ In set you can add the item but you cannot change an item which is defined earlier.
- ✓ You can use len() method to determine the length of a set.
- ✓ Set items have any data type. Set is defined as object of type set.
- ✓ You can also use the set() constructor to define the set, as set is an object of type set.
- ✓ You cannot fetch a single value from a set, instead you can loop through the set of use if condition for check for the value in a set.
- ✓ To add items to a set you will use add() method. Use update() method if you want to add another set into a set.
- ✓ Update() method can accept any iterable object like list, set, dictionary or tuple.
- ✓ You can use remove() or discard() methods to remove an item from the set.
- ✓ If any removable item is not present in a set then remove() method will raise an error. While discard() method do not raise any error upon unsuccessful.
- ✓ You can also use the pop() method for the same purpose. But as set is unordered so pop() method will remove any last item and then return the last removed item. So using pop() method is not an efficient method to use, for this purpose.
- ✓ Methods update() and union() will also remove any duplicate value first then unite both.
- ✓ Intersection() method will only merge duplicate values in both sets.
- ✓ The difference between intersection() vs intersection\_update() methods is that intersection() method will return a new set, while intersection\_update() will not return new set.
- ✓ symmetric\_difference\_update() method will return a new set with the value which are uncommon in both sets.

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## **Python Dictionaries:**

- ✓ Dictionary is a type of collection in python which have key/value pairs.
- ✓ Dictionary is ordered and changeable by default but doesn't allow duplicate values.
- ✓ Dictionaries uses curly brackets to define its key/value pair.
- ✓ Use len() function to know the full length of items in a dictionary.
- ✓ Dictionary can contains any data type of items in it.
- ✓ Type() function will return dictionary as object of type dict.
- ✓ You can access the single item from the dictionary by referring to the desired key in a square brackets. The get() method can also be used for the same purpose.
- ✓ You can use keys() method to fetch all the key present in a dictionary.
- ✓ You can use the values() method of the dictionary variable to get the values of the keys at once.
- ✓ The items() method will return all the data of the dictionary as tuple in a list.
- ✓ You can also use the in keyword with if condition to verify the desired key present in the dictionary.
- ✓ The update() method will update the desired key/value pair in a dictionary with the given parameters. You have to use any iterable object for that purpose. If the item doesnot exist then it will be added to the dictionary.
- ✓ The pop() method and popitem() method can be use to delete or remove a specified item from the dictionary.
- ✓ The del keyword can delete a single key/value pair and whole dictionary as well.
- ✓ The clear() method will empty the dictionary completely.
- ✓ The copy() method is used to copy a dictionary into another dictionary.
- ✓ A dictionary can also be a dictionary.

## **Python Conditions:**

- ✓ Python supports common mathematical logical condition in a python program.
- ✓ These mathematical logical condition can be used by any way in a python program by most common is if condition and loops.
- ✓ The if statement is written with the help of using if keyword in the start.
- ✓ These common mathematical conditons are:
  - Equal to (==).
  - Not Equal To (!=).
  - Less than (<).
  - Greater Than (>).
  - Greater than equal to (>=).
  - Less Than equal to (<=).
- ✓ Python Programming heavily relies on indentation, other programming uses curly brackets for the same purpose.
- ✓ Elif statement is used with the if statement and executes when if statement becomes false.
- ✓ Else statement is another way of both if statement as well as elif statement will be false.
- ✓ If statement is executed only when the condition is true.
- ✓ You can also use and logical operator to combine two or more logical condition together and display the result.
- ✓ The or keyword is used to check one of both value is true or not. Or keyword works when one of both value is true.
- ✓ You can also use if statement inside if statement too. This is called nested if statements.

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- ✓ Code block cannot be kept empty in python so use pass statement to avoid errors.

## **Python While Loop:**

- ✓ Python only supports two types of loop, these are while loop and for loop.
- ✓ While loop works till the specified condition remains true. When the condition becomes false while loop will stop executing the code inside it.
- ✓ While loop requires an increment variable to execute, when that variable is not available the while loop will continue to execute forever. That variable is called index variable.
- ✓ You can also use the break keyword to halt the while loop execution even the condition is true.
- ✓ Continue keyword will skip the current iteration and continue from very next.
- ✓ You can also use the else statement with while loop like you will use with if statement.
- ✓ Else statement with while loop only executes when the loop variable becomes false.

## **Python For Loop:**

- ✓ The another type of loop in python is for loop.
- ✓ For loop works like an iterator method in python programming language and requires in keyword to continue to execute the block of code statements within it.
- ✓ Generally we use for loop to iterate python collections.
- ✓ Strings are just a sequence of characters.
- ✓ For loop can also be used to iterate strings.
- ✓ We can also use the keywords break and continue with for loop in python too.
- ✓ The range() function can be used to iterate for a desired counting.
- ✓ The range() function starts with 0 by default, and increases by one.
- ✓ The range() function can be modified further to specify the range() from start to finish.
- ✓ To increment the range() function by user desire add the third parameter to it to iterate by that number.
- ✓ Else statement can also be used with this for method, and it will be executed when the for method is finished execution. Else statement cannot be executed when the loop is explicitly break. Else statement implicitly executes when the for method is complete the execution.
- ✓ For method can be nested. Nested For method will be executed for each index of the outer for method.
- ✓ The pass statement is used when you have to use for method by you have no content to loop through. Then use pass inside that for method to bypass the for method.

## **Python Functions:**

- ✓ Function is a block of code which is executed upon calling that function.
- ✓ Functions can accept data that is known as parameters.
- ✓ Functions based on their code block, can return calculated values.
- ✓ To define a function use the def keyword followed by the name of the function with pair of round brackets and then start the function block with the help of colon (:)
- ✓ You can call a defined function or a built-in function by just typing the name of the function with parentheses. Pair of round brackets are also known as parentheses.
- ✓ As stated before some data can be passed to the function as parameters. Parameters are inside the parentheses and separated by the use of comma (,).
- ✓ Parameters have different names like arguments and can be shortened like args in documentation.

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- ✓ The difference between parameters vs arguments is that parameters are the actual variables inside the function parentheses. While arguments are the values that are passed to the function upon calling of that function.
- ✓ For the case of multiple arguments you can use the asterisk (\*) symbol before the parameter name. This way you can pass multiple values to a single variable. In response function treat that parameter values like a list.
- ✓ Parameter name with an asterisk is called Arbitrary Arguments.
- ✓ You can also pass the argument values in key/pair order, in this way order of parameters can be different.
- ✓ In python documentations kwargs is often used for keyword arbitrary arguments.
- ✓ You can also use double asterisk before the parameter name, this way function will treat that parameter like a dictionary. This method is used when you are not sure about the key/value that will be passed to the function. \*\*kwargs is used in python documentations for arbitrary keyword arguments.
- ✓ Function parameters can have default value. This will work when function arguments are missed, then default value of parameters will be used to execute the function.
- ✓ Functions parameters can be of any types.
- ✓ For function to give value back use the return keyword inside the function.
- ✓ You can also define the function with now code block. For that function to work use the pass keyword inside the defined function.
- ✓ Recursion is an approach in mathematical and programming concepts. In programming we can use the same function in side a same function. This method is used to loop through the data to get the desired result.
- ✓ Recursion function can be very efficient in mathematically-elegant approach toward programming. But the developer has to be very careful for the function, as it can be easily fall to a function which never terminates/ends. Or can use excess amount of memory else processor power.
- ✓ Lambda is a newer type of function in Python. It is also called a function without name. It can accept any type as well as any number of parameters. But lambda function have only one expression. That expression is executed and the result is given.

## Python OOP:

- ✓ Python programming language is an object oriented programming language.
- ✓ Python Classes have only a constructor which is enough to declare an object of a class.
- ✓ In python programming everything is an object and have some kind of properties and methods.
- ✓ We can use the word class to declare a python class for our program.
- ✓ In order to create an object of a class, we just use the name of the class and assign it to the variable. That variable is now be the object of a class in python.
- ✓ `__init__()` is the crucial method in python programs. This method is usually use for the initialization of the class variables.
- ✓ The `__init__()` method is constructor method which is automatically called upon object creation and also function calling.
- ✓ An object can also contain the methods which are called object behaviours.
- ✓ An object have variables called object states.
- ✓ Every object have some states and behaviours, which are represent by class variables and class methods.

# Python Lessons

- ✓ The self parameter is used in definition of a class method in python class to declare the class method correctly.
- ✓ Without self parameter you will get an error.
- ✓ Self variable acts like this keyword in other programming languages.
- ✓ It is used to access the class variables. Which is called states of an object.
- ✓ The self parameter has to be the first parameter in any python class method.
- ✓ Self parameter can be of any name, but self is traditionally used.
- ✓ Class variables can be accessed directly by calling them through object name.
- ✓ Del keyword is used to remove any class variable as well as you can also remove any object which is defined before.
- ✓ Pass statement is used when you have no content block in any class function but have function definition.
- ✓ Inheritance is the concept in python programming in which class b inherits all the class methods of class a.
- ✓ Inheritance can be achieved by passing name of class a as parameter in class b.
- ✓ This way class b will inherit all the class methods of class a.
- ✓ The super() method is used to import the constructor of the super class.
- ✓ If the class b has same name method of class a this is called method overriding.

## **Python Modules:**

- ✓ Modules in python are same like a functions library.
- ✓ You can create a separate file which contains all the functions which will be used in future programs.
- ✓ In order to create your own python module, you have first create a file and then write your desired code in it then save and close it.
- ✓ You can use your own defined module first by import that module file in another file, and called that function in another file.
- ✓ To use a function from a module use the module name dot function name.
- ✓ You can also assign alias to your imported module.
- ✓ For OOP based module use (from module file name import class name).
- ✓ There are many modules built-in in python which you can use at your convenience.

## **Python Iterator:**

- ✓ Iterator in python are objects which is used to iterate upon python collections.
- ✓ Iterator methods are iter() and next().
- ✓ Python collections are all iterable objects. These are just an iterable container from which you can get iterator from.
- ✓ We can use iterator instead of loops.
- ✓ Strings can also be iterable.
- ✓ The StopIteration statement is used to Stop iteration at specified process.

## **Python Miscellaneous:**

- ✓ Dates in python is not any data type. We can import a module datetime to work with dates objects in our python code.
- ✓ Datetime module will return in this format: year, month, date, hours, minutes, seconds and microseconds.

# Python Lessons

- ✓ Datetime module has many methods to play with date and time.
- ✓ We can create an object from datetime module. For this to be happen datetime() class constructor from datetime module requires three parameters in (years,month,date) format. Hours, minutes, seconds, microseconds and time zone are optional parameters.
- ✓ The strftime() function requires a format in which date will be represented to the client.
- ✓ Python has a set of build-in maths function. You can use these methods to perform mathematical operations on numbers.
- ✓ Python has also a module named math which actually have more mathematical functions.

## Python JSON:

- ✓ JSON is the way for storing and exchanging data.
- ✓ JSON is a text based syntax and uses JavaScript Object Notation.
- ✓ Python has a built-in package in standard library called json.
- ✓ In order to convert from json code into python code you can use json.loads() method of the json package. The result we get will be a python dictionary.
- ✓ Json.loads() method accept a parameter which is in json syntax.
- ✓ You script file name should be different rather json.py
- ✓ json.dumps()function is used for Python to Json conversion.
- ✓ Json.dumps() method accepts one parameter which will be any python object.
- ✓ Json string will be of type string in any python program.
- ✓ Json.dumps() method also accepts other optional parameters which are indent and separator which is actually used to format data for json.
- ✓ The default separator parameter values are (“,”:”). You can also define you own separator values to this parameter to be used for json.
- ✓ You can also use sort\_keys parameter in json.dumps() method to sort all key values.

## Python Regx:

- ✓ Regex is known as Regular expression which is used to search in a string.
- ✓ Regex is just a search pattern for a string.
- ✓ Python has a built-in module called re , which is used for regular expressions.
- ✓ To start using regex you have to import re first in a python program.
- ✓ Meta-character in python are special characters with special meaning.
- ✓ The backslash followed by a character is used for searching.
- ✓ A set is use for exact searching of any character. In pair of square brackets you would define the characters to find.
- ✓ The match object contains the search and result information. If there is no match None will be returned to the console.
- ✓ Match object has some properties and methods which is used to get the search and result string information.

## Python PIP:

- ✓ PIP in python is a default package manager.
- ✓ It is used for installing new modules in virtual environment of python.
- ✓ Package is the group of all files in a python module.
- ✓ Python Modules are a set of libraries which provides additionally required functionality to the python script.

# Python Lessons

## **Python Exception Handling:**

- ✓ Exception handling in the python language can be defined as the way to handle python errors.
- ✓ The Try block let you enable to test the piece of code to be executed.
- ✓ The Except block will be used to handle errors which are present in the code written in the try block.
- ✓ The Finally block will be executed whether Try block is successful or the Except block catches the error. The best use of Finally block is to close database connections as well as close any opened file in the python code.
- ✓ Whenever in the Try block there will be an exception, then python interpreter will stop executing the further code and switch to Except block for exception handling.
- ✓ Without Try and Except block program will crash and the interpreter will raise an error.
- ✓ You can also define multiple Except blocks to handle different kinds of exceptions.
- ✓ As with Except block you can define Else block also with Try, Except, Else and Finally blocks. The purpose of Else block is opposite to Except Block. Else block will be executed when Try block will executed Error Free.
- ✓ Being a developer you can also eligible to throw the exception in a python program. To raise an exception you have to define a condition first then use the raise keyword followed by the Exception() constructor, and pass the desired statement as a parameter to that constructor. You can also define the raise Exception type to be thrown upon.

## **Python User Input:**

- ✓ Python allows its users to enter some kind of data to the python program at the time of program execution.
- ✓ This process is known as user input.
- ✓ Python 3 has a built-in function which is used for this purpose.
- ✓ Input() function is the built-in python 3 function for user input.
- ✓ Input() function accept print statement to ask from the user for input.
- ✓ Python 3 interpreter will wait for the user input and then execute further.

## **Python MySQL:**

- ✓ Python programming language can be used to manipulate databases.
- ✓ Python supports many database engines.
- ✓ One of the database we use often is MySql server.
- ✓ Python requires MySql connector driver to communicate with the MySql.
- ✓ To install MySql connector driver you can use pip in virtual environment of the python.
- ✓ After installing of the connector driver, you can import it into any python script. If it executed successful, the connector drive was successfully installed.
- ✓ Once the connection to the MySql is successful, you can then use SQL queries to query the database.
- ✓ You have to commit the database connection in order to insert the new record to the database table.
- ✓ To insert multiple records at once use the executemany() function of the cursor.
- ✓ Fetchall() method is used to fetch multiple records from the table.
- ✓ Fetchone() method is used to fetch one record from the table.
- ✓ Use % sign to use wildcard in queries.
- ✓ In order to prevent SQL Injection use the %s string placeholder in queries values.



# Python Lessons

**Python MongoDB:** [https://www.w3schools.com/python/python\\_mongodb\\_getstarted.asp](https://www.w3schools.com/python/python_mongodb_getstarted.asp)

**Practice For You Own Success**

**Python Practice:**

1. <https://www.dataquest.io/blog/python-practice/>
2. <https://www.hackerrank.com/domains/python>
3. <https://edabit.com/challenges/python3>

**Python References:**

1. The Python Standard Library: <https://docs.python.org/3/library/index.html>
2. Mathematical functions: <https://docs.python.org/3/library/math.html>
3. Basic date and time types: <https://docs.python.org/3/library/datetime.htm>