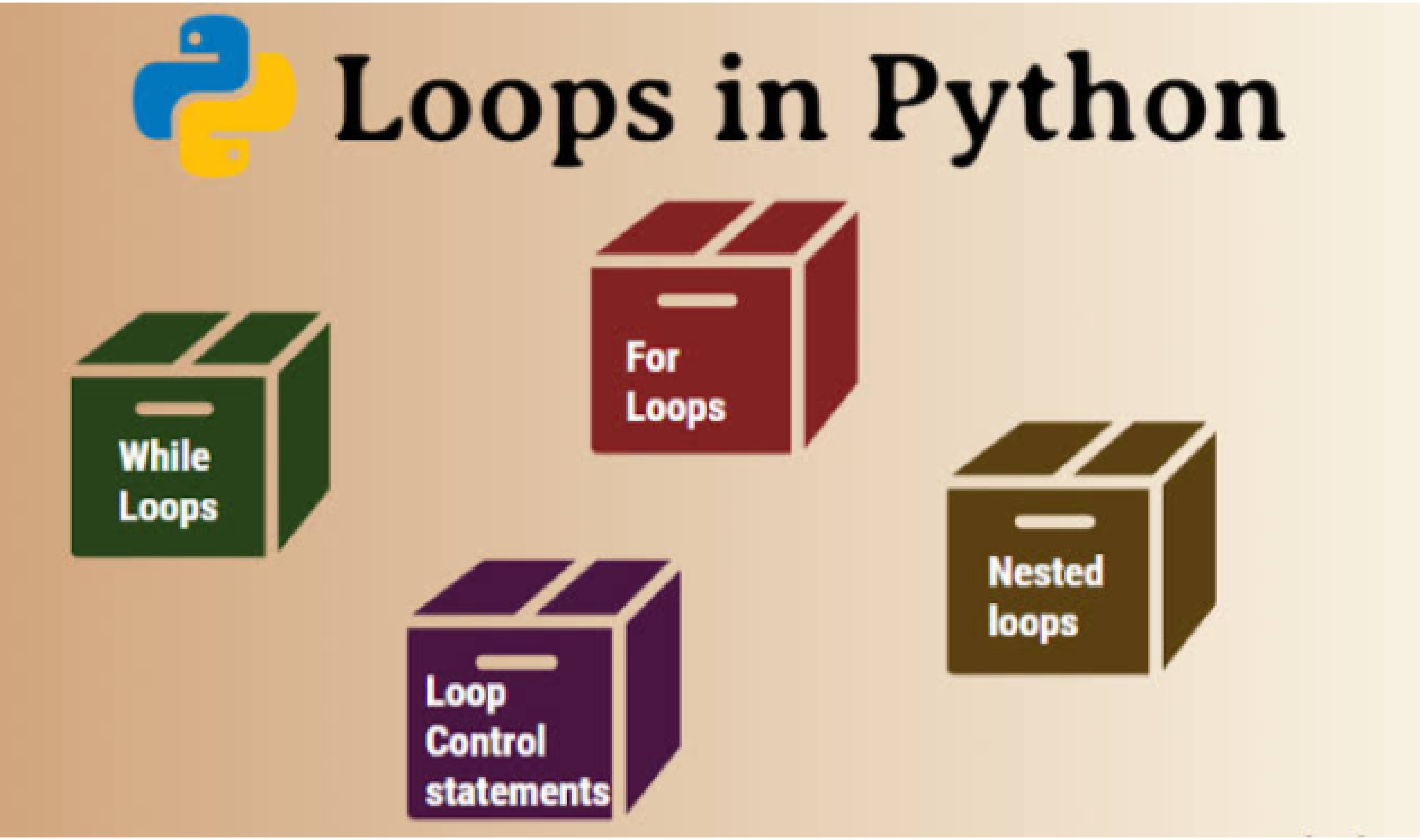
Python


Loops in Python
For Loops
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Loops in Python

Python programming language provides the following types of loops to handle looping requirements. Python provides three ways for executing the loops. While all the ways provide similar basic functionality, they differ in their syntax and condition-checking time.

While Loop in Python

In python, a while loop is used to execute a block of statements repeatedly until a given condition is satisfied. And when the condition becomes false, the line immediately after the loop in the program is executed.

Syntax:

```
while expression:

    statement(s)
```

All the statements indented by the same number of character spaces after a programming construct are considered to be part of a single block of code. Python uses indentation as its method of grouping statements.

Example of Python While Loop

Let’s see a simple example of while loop in Python.

Python3

```python
# Python program to illustrate
# while loop
count = 0
while (count < 3):
    count = count + 1
    print("Hello Geek")
```

Output:

```
Hello Geek
Hello Geek
Hello Geek
```

Using else statement with While Loop in Python

The else clause is only executed when your while condition becomes false. If you break out of the loop, or if an exception is raised, it won’t be executed.

Syntax of While Loop with else statement:

```
while condition:

     # execute these statements

else:

     # execute these statements
```

Examples of While Loop with else statement

Here is an example of while loop with else statement in Python:

Python3

```python
# Python program to illustrate
# combining else with while

count = 0

while (count < 3):

    count = count + 1

    print("Hello Geek")

else:

    print("In Else Block")
```

Output:

```
Hello Geek

Hello Geek

Hello Geek

In Else Block
```

Infinite While Loop in Python

If we want a block of code to execute infinite number of time, we can use the while loop in Python to do so.

Python3

```
# Python program to illustrate
# Single statement while block
count = 0
while (count == 0):
    print("Hello Geek")
```

Note: It is suggested **not to use** this type of loop as it is a never-ending infinite loop where the condition is always true and you have to forcefully terminate the compiler.

For Loop in Python

For loops are used for sequential traversal. For example: traversing a list or string or array etc. In Python, there is “for in” loop which is similar to for each loop in other languages. Let us learn how to use for in loop for sequential traversals.

Syntax:

```
for iterator_var in sequence:

    statements(s)
```

It can be used to iterate over a range and iterators.

Python3

```
# Python program to illustrate
# Iterating over range 0 to n-1

n = 4
for i in range(0, n):
    print(i)
```

Output :

```
0
1
2
3
```

We can use for loop to iterate lists, tuples, strings and dictionaries in Python.

Python3

```
# Python program to illustrate
# Iterating over a list
print("List Iteration")
l = ["geeks", "for", "geeks"]
for i in l:
    print(i)
# Iterating over a tuple (immutable)
print("\nTuple Iteration")
t = ("geeks", "for", "geeks")
for i in t:
    print(i)
# Iterating over a String
print("\nString Iteration")
s = "Geeks"
for i in s:
    print(i)
# Iterating over dictionary
print("\nDictionary Iteration")
d = dict()
d['xyz'] = 123
d['abc'] = 345
for i in d:
    print("%s  %d" % (i, d[i]))
# Iterating over a set
print("\nSet Iteration")
set1 = {1, 2, 3, 4, 5, 6}
for i in set1:
    print(i),
```

Output:

```
List Iteration
geeks
for
geeks

Tuple Iteration
geeks
for
geeks

String Iteration
G
e
e
k
s

Dictionary Iteration
xyz  123
abc  345
```

Iterating by the index of sequences

We can also use the index of elements in the sequence to iterate. The key idea is to first calculate the length of the list and in iterate over the sequence within the range of this length. See the below example:

Python3

```python
# Python program to illustrate
# Iterating by index

list = ["geeks", "for", "geeks"]
for index in range(len(list)):
    print(list[index])
```

Output:

```
geeks
for
geeks
```

Using else statement with for loop in Python

We can also combine else statement with for loop like in while loop. But as there is no condition in for loop based on which the execution will terminate so the else block will be executed immediately after for block finishes execution.

Python3

```python
# Python program to illustrate
# combining else with for

list = ["geeks", "for", "geeks"]

for index in range(len(list)):

    print(list[index])

else:

    print("Inside Else Block")
```

Output:

```
geeks

for

geeks

Inside Else Block
```

Nested Loops

Python programming language allows to use one loop inside another loop. Following section shows few examples to illustrate the concept.

Syntax:

```
for iterator_var in sequence:

   for iterator_var in sequence:

       statements(s)

   statements(s)
```

The syntax for a nested while loop statement in the Python programming language is as follows:

```
while expression:

   while expression:

       statement(s)

   statement(s)
```

A final note on loop nesting is that we can put any type of loop inside of any other type of loop. For example, a for loop can be inside a while loop or vice versa.

```python
# Python program to illustrate
# nested for loops in Python
from __future__ import print_function
for i in range(1, 5):
    for j in range(i):
        print(i, end=' ')
    print()
```

Output:

```
1
2 2
3 3 3
4 4 4 4
```

Loop Control Statements

Loop control statements change execution from their normal sequence. When execution leaves a scope, all automatic objects that were created in that scope are destroyed. Python supports the following control statements.

Continue Statement

the continue statement in Python returns the control to the beginning of the loop.

```python
# Prints all letters except 'e' and 's'
for letter in 'geeksforgeeks':
    if letter == 'e' or letter == 's':
        continue
    print('Current Letter :', letter)
```

Output:

```
Current Letter : g
Current Letter : k
Current Letter : f
Current Letter : o
Current Letter : r
Current Letter : g
Current Letter : k
```

Break Statement

The break statement in Python brings control out of the loop.

```
for letter in 'geeksforgeeks':

    # break the loop as soon it sees 'e'
    # or 's'
    if letter == 'e' or letter == 's':
        break

print('Current Letter :', letter)
```

Output:

```
Current Letter : e
```

Pass Statement

We use pass statement in Python to write empty loops. Pass is also used for empty control statements, functions and classes.

```python
# An empty loop
for letter in 'geeksforgeeks':
    pass
print('Last Letter :', letter)
```

Output:

```
Last Letter : s
```