Lecture 11: Python Programing 3

Objectives

- The student should learn more about writing more advanced Python code.
- learn to iterate over a sequence of elements using the different variations of for loop.
- learn to iterate over a sequence of elements using the different variations of while loop in Python

For…. Loops

- ***The `for` statement allows us to iterate through a sequence of values.***
- ***`for <var> in <sequence>:`***
  `<body>`

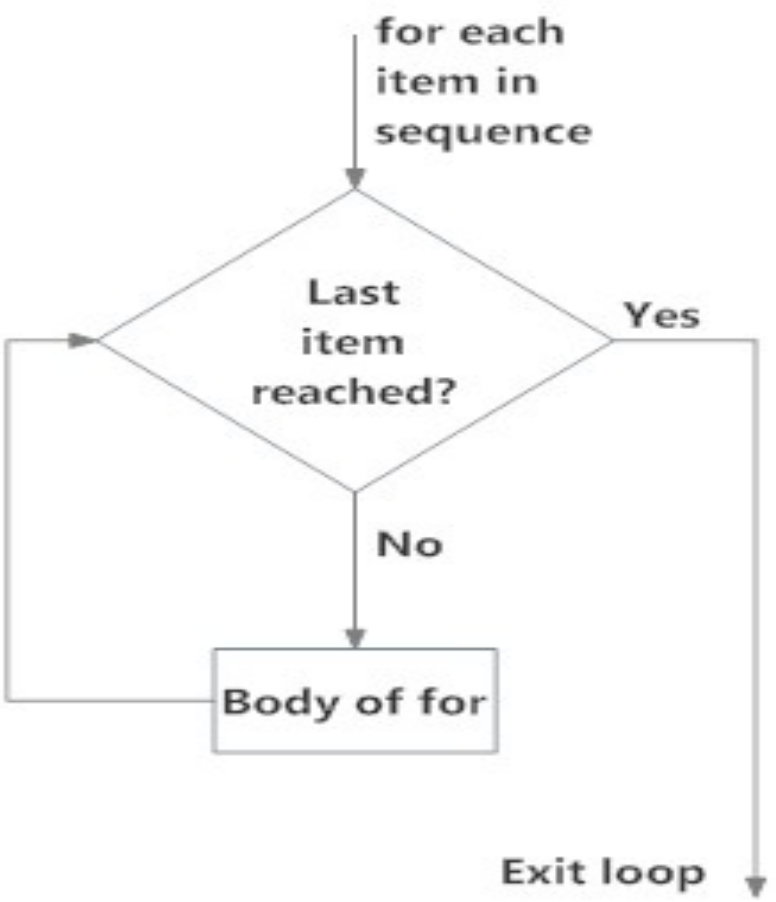
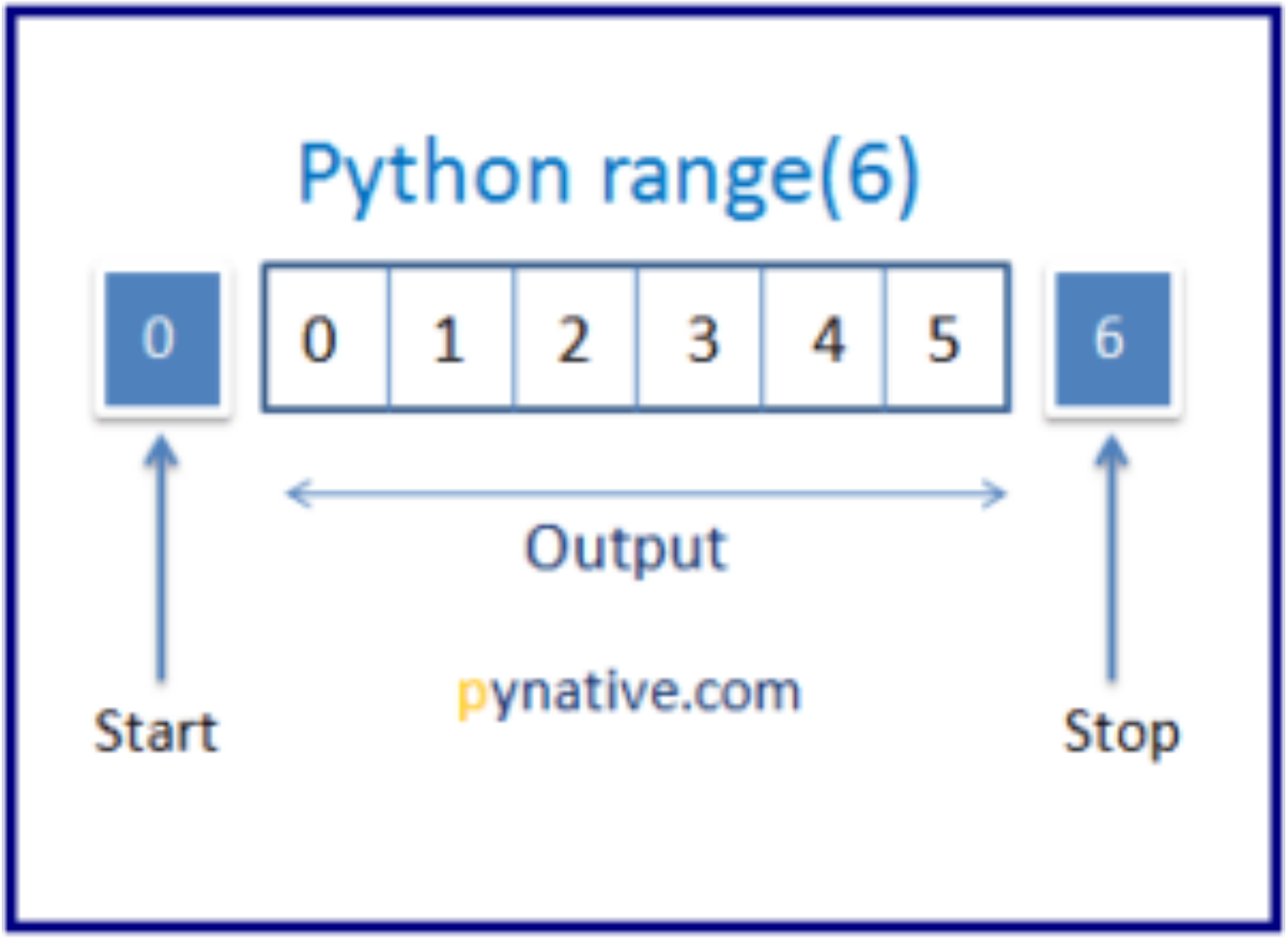


Fig: operation of for loop


Python range(6)
0
0
1
2
3
4
5
6
Output
pynative.com
Start
Stop

For.... Loops

```
for i in range(5):
    print(i)
```

```
0
1
2
3
4
>>>
```

The for loop in Python is used to iterate over a sequence.

Syntax of for loop

for val in sequence:

Body of for

Here, val is the variable that takes the value of the item inside the sequence on each iteration.

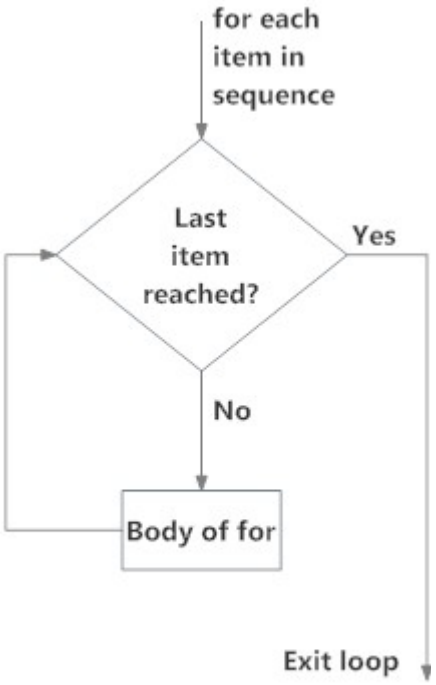
Loop continues until we reach the last item in the sequence

We can generate a sequence of numbers using range() function. range(5) will generate numbers from 0 to 4 (5 numbers).

For.... Loops

```
count=1
for count in range(1,5):
    print(count)
```

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



We can also define the start, stop and step size as `range(start,stop,step size)`. step size defaults to 1 if not provided. Loop continues until we reach the last item in the sequence.

For....Loops

```
sum=0
count=1
for count in range(1,5):
    sum=sum+count
    print(count,sum)
```

```
1       1
2       3
3       6
4       10
>>>
```

For... Loops

- Input the count of the numbers, n
- Initialize sum to 0
- Loop n times
  - Input a number, x
  - Add x to sum
- Output average as sum/n

For... Loops

```
# average1.py
#    A program to average a set of numbers
#    Illustrates counted loop with accumulator


n = eval(input("How many numbers do you have? "))
sum = 0.0
for i in range(n):
    x = eval(input("Enter a number >> "))
    sum = sum + x
print("\nThe average of the numbers is", sum / n)
```

For.... Loops

```
How many numbers do you have? 5
Enter a number >> 32
Enter a number >> 45
Enter a number >> 34
Enter a number >> 76
Enter a number >> 45

The average of the numbers is 46.4
```

While ….Loops

- `while <condition>:`
  `    <body>`
- `condition` is a Boolean expression, just like in `if` statements. The body is a sequence of one or more statements.
- Semantically, the body of the loop executes repeatedly as long as the condition remains true. When the condition is false, the loop terminates.

While ....Loops

- The condition is tested at the top of the loop. This is known as a *pre-test* loop. If the condition is initially false, the loop body will not execute at all.

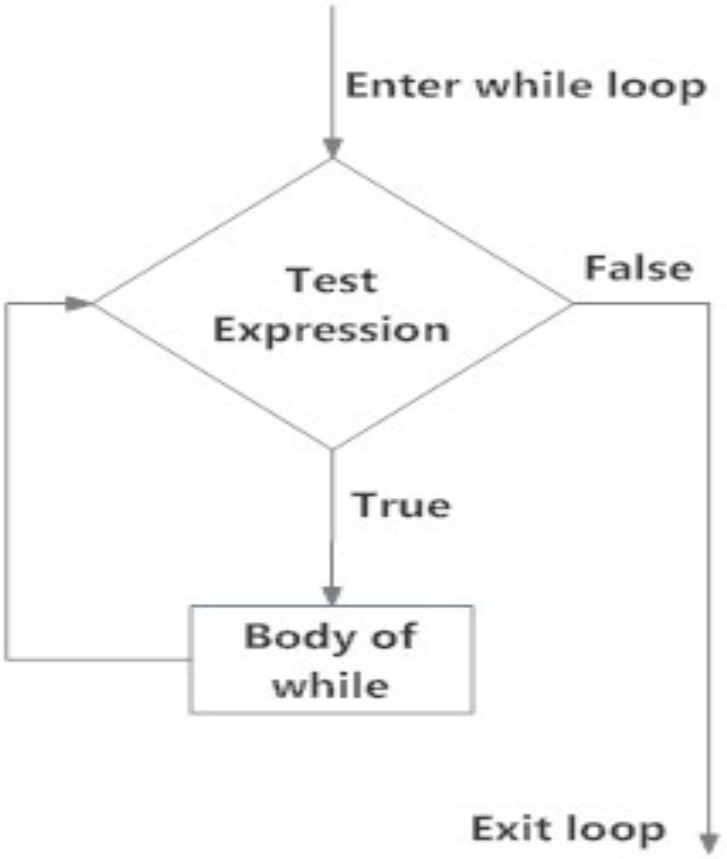


Fig: operation of while loop

While...Loop

Here's an example of a `while` loop that counts from 0 to 10:

```
i = 0
while i <= 10:
    print(i)
    i = i + 1
```

The code has the same output as this `for` loop:

```
for i in range(11):
    print(i)
```

```
0
1
2
3
4
5
6
7
8
9
10
```

Interactive Loops

```
# average2.py
#    A program to average a set of numbers
#    Illustrates interactive loop with two accumulators


moredata = "yes"
sum = 0.0
count = 0
while moredata == 'yes':
    x = eval(input("Enter a number >> "))
    sum = sum + x
    count = count + 1
    moredata = input("Do you have more numbers (yes or no)?
 ")
print("\nThe average of the numbers is", sum / count)
```

Interactive Loops

```
Enter a number >> 32
Do you have more numbers (yes or no)? yes
Enter a number >> 45
Do you have more numbers (yes or no)? yes
Enter a number >> 34
Do you have more numbers (yes or no)? yes
Enter a number >> 76
Do you have more numbers (yes or no)? yes
Enter a number >> 45
Do you have more numbers (yes or no)? no

The average of the numbers is 46.4
```

Sentinel Loops

```
# average3.py
#    A program to average a set of numbers
#    Illustrates sentinel loop using negative input as sentinel

sum = 0.0
count = 0
x = eval(input("Enter a number (negative to quit) >> "))
while x >= 0:
    sum = sum + x
    count = count + 1
    x = eval(input("Enter a number (negative to quit) >> "))
print("\nThe average of the numbers is", sum / count)
```

Sentinel Loops

```
Enter a number (negative to quit) >> 32
Enter a number (negative to quit) >> 45
Enter a number (negative to quit) >> 34
Enter a number (negative to quit) >> 76
Enter a number (negative to quit) >> 45
Enter a number (negative to quit) >> -1

The average of the numbers is 46.4
```

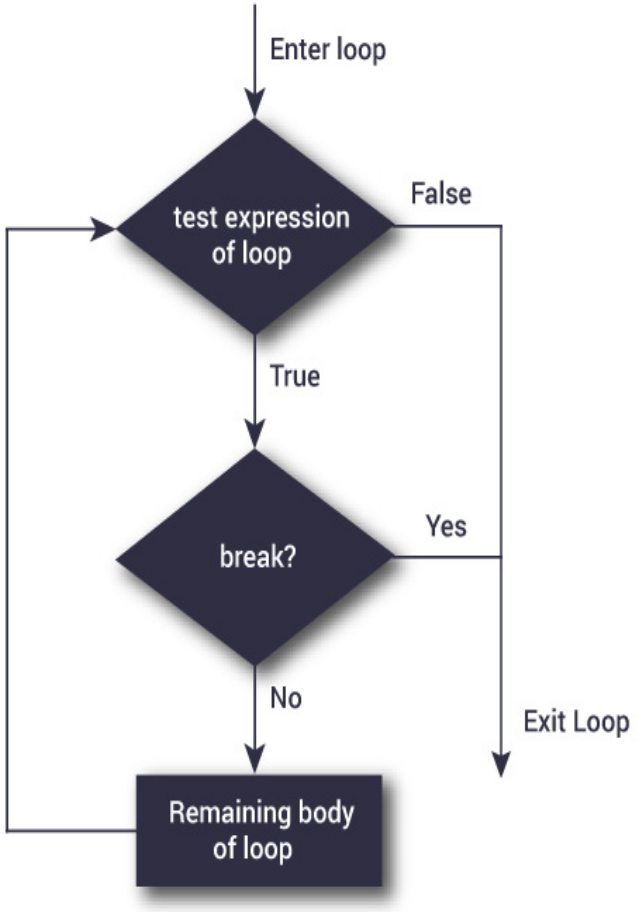
Loops....Break

```
for var in sequence:
    # codes inside for loop
    if  condition:
        break
    # codes inside for loop

# codes outside for loop
```

```
while test expression:
    # codes inside while loop
    if  condition:
        break
    # codes inside while loop

# codes outside while loop
```



Loops....Break

```
for i in range(1,10):
    if i==5:
        break
    print(i)
```

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

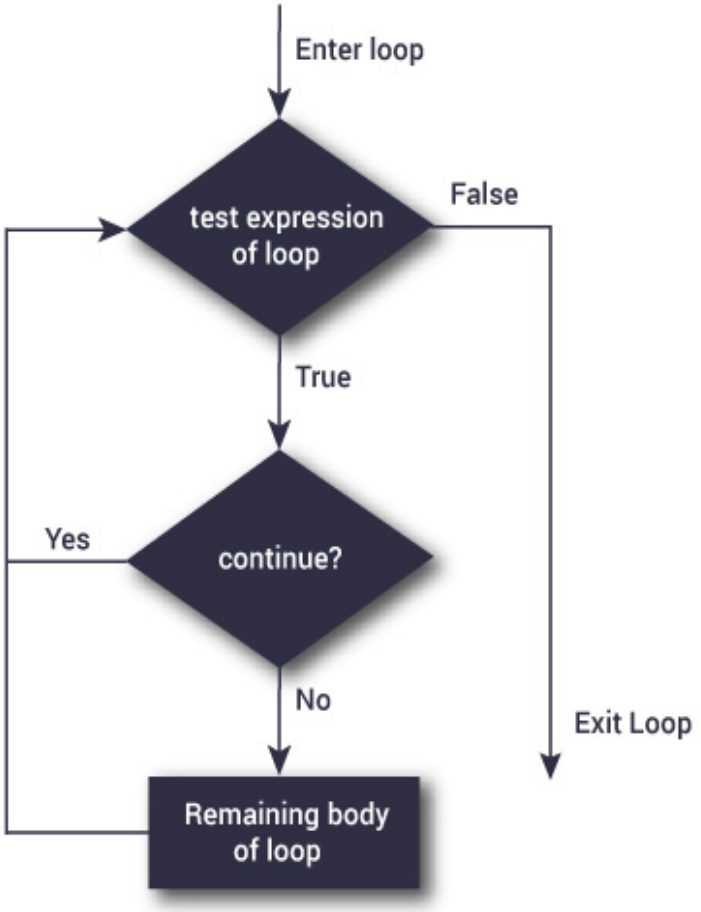
Loops....continue

```
for var in sequence:
    # codes inside for loop
    if  condition:
        continue
    # codes inside for loop

# codes outside for loop
```

```
while test expression:
    # codes inside while loop
    if  condition:
        continue
    # codes  inside while loop

# codes outside while loop
```



Loops....continue

```
for i in range(1,10):
    if i==5:
        continue
    print(i)
```

```
1
2
3
4
6
7
8
9
>>>
```

```
for val in "string":
    if val == "i":
        continue
    print(val)
print("The end")
```

```
s
t
r
n
g
The end
>>>
```

Files in Python

- https://www.youtube.com/watch?v=6TFJs9uzEjI&t=7s

- https://www.youtube.com/watch?v=L60VCRM4_GM&t=5s