SNS COLLEGE OF ENGINEERING
Kurumbapalayam (Po), Coimbatore – 641 107

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19IT103 – COMPUTATIONAL THINKING AND PYTHON PROGRAMMING

- **A readable, dynamic, pleasant, flexible, fast and powerful language**

Session wise Agenda

- **session 1 - List (Operations, Slice, Methods)**
- **Session 2 - List (Loop, Mutability)**
- **Session 3 - List (Aliasing, Cloning, Parameters)**
- Session 4 - Tuples (Assignment, as return value)
- Session 5 - Dictionaries (operations and methods)
- Session 6 - Advance List processing, List Comprehension
- Session 7 - Simple Sort, Histogram
- Session 8 - Student Mark Statement
- Session 9 - Retail Bill preparation

Recap

- List is a sequence data type which can be traversed in 8 different ways
- List are Mutable → the values in the list can be changed. This process is called mutability

List Aliasing

- In this a single list object is created and modified using the subscript operator.
- When the first element of the list named "**a**" is replaced, the first element of the list named "**b**" is also replaced.
- This type of change is what is known as a **side effect**. This happens because after the assignment **b=a**, the variables **a** and**b** refer to the exact same list object.
- They are **aliases** for the same object. This phenomenon is known as **aliasing**.
- To prevent aliasing, a new object can be created and the contents of the original can be copied which is called **cloning.**

List Aliasing

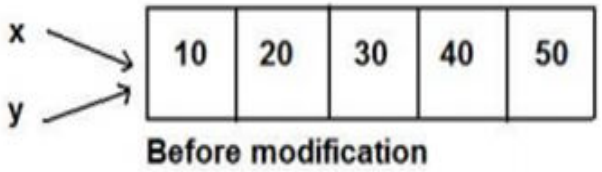
```
a=[1,2,3,4,5]
b=a
print(b)
print(b is a)
a[0]=100
print(a,"\n",b)
```

```
[1, 2, 3, 4, 5]
True
[100, 2, 3, 4, 5]
 [100, 2, 3, 4, 5]
```

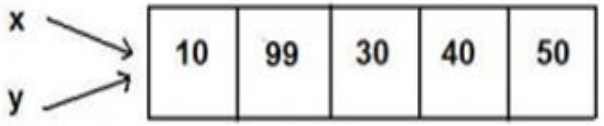
List Aliasing

```
x = [10,20,30,40,50]
y = x #x is aliased as y
print(x) will display [10,20,30,40,50]
print(y) will display [10,20,30,40,50]
```

```
x[1] = 99 #modify 1st element in x
print(x) will display [10,99,30,40,50]
print(y) will display [10,99,30,40,50]
```



Before modification



After modification

List Cloning

- To avoid the disadvantages of copying we are using cloning. creating a copy of a same list of elements with two different memory locations is called cloning.
- Changes in one list will not affect locations of another list.

Cloning using Slicing

```
a=[1,2,3,4,5]
b=a[:]
print(b)
print(b is a)
```

Shell

```
[1, 2, 3, 4, 5]
False
```

Cloning using List( ) method

main.py

```
1  a=[1,2,3,4,5]
2  b=list(a)
3  print(b)
4  print(a is b)
5  a[0]=100
6  print(a)
7  print(b)
```

Shell

```
[1, 2, 3, 4, 5]
False
[100, 2, 3, 4, 5]
[1, 2, 3, 4, 5]
```

Cloning using copy() method

main.py

```
1  a=[1,2,3,4,5]
2  b=a.copy()
3  print(b)
4  print(a is b)
```

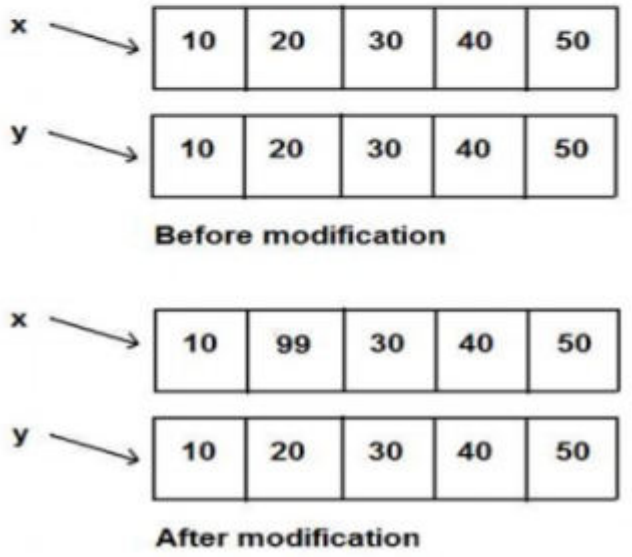
Shell

```
[1, 2, 3, 4, 5]
False
```

List Cloning

```
x = [10,20,30,40,50]

y = x[:] #x is cloned as y

print(x) will display [10,20,30,40,50]

print(y) will display [10,20,30,40,50]

x[1] = 99 #modify 1st element in x

print(x) will display [10,99,30,40,50]

print(y) will display [10,20,30,40,50]
```

y = x[:] #x is cloned as y



List Cloning

8 Ways to Clone / Copy a List

Using Functions / Operations

1.Use slicing - bl = al[:] (apparently, the fastest technique)

2.Use list comprehension bl = [elem for elem in al]

3.Use list() function

Using Methods

4. Use the .copy method - bl = al.copy()

5. Using .extend method

6. Using .append method

Using Modules

7. Use copy.copy()

8. Use copy.deecopy()

List Cloning

https://www.geeksforgeeks.org/python-cloning-copying-list/

Refer the above link for 8 types of cloning

List as Parameters

- In python, arguments are passed by reference.
- If any changes are done in the parameter which refers within the function, then the changes also reflects back in the calling function.
- Passing a list as an argument actually passes a reference to the list, not a copy of the list.
- Since lists are mutable, changes made to the elements referenced by the parameter change the same list that the argument is referencing.

List as Parameters

main.py

```
1 def inside(a):
2     for i in range(0,len(a),1):
3         a[i]=a[i]+10
4         print("inside",a)
5 a=[1,2,3,4,5]
6 inside(a)
7 print("outside",a)
```

Shell

```
inside [11, 12, 13, 14, 15]
outside [11, 12, 13, 14, 15]
```

List as Parameters

```
def my_function(food):
  for x in food:
    print(x)

fruits = ["apple", "banana", "cherry"]

my_function(fruits)
```

```
def append_ten(a_list):
    a_list.append(10)
    return a_list

print(append_ten([1, 2, 3]))
```

OUTPUT

```
[1, 2, 3, 10]
```

List as Parameters

```
def sum_list_elements(a_list):
    sum = 0
    for i in range(len(a_list)):
        sum += a_list[i]
    return sum

print(sum_list_elements([1, 2, 3, 4, 5]))
```

OUTPUT

```
15
```

Summary

- Aliasing → copying the List i.e. the memory will be same for both the List variables. If any changes made in one list will affect other.
- Cloning → copying the List but the memory location is different. If any changes made in one list will not affect other.
- List as Parameter → List is passed as parameter to a function i.e. as Call by Reference (Address). If any changes made in the list inside function the change will occur in the calling function also

THANK YOU