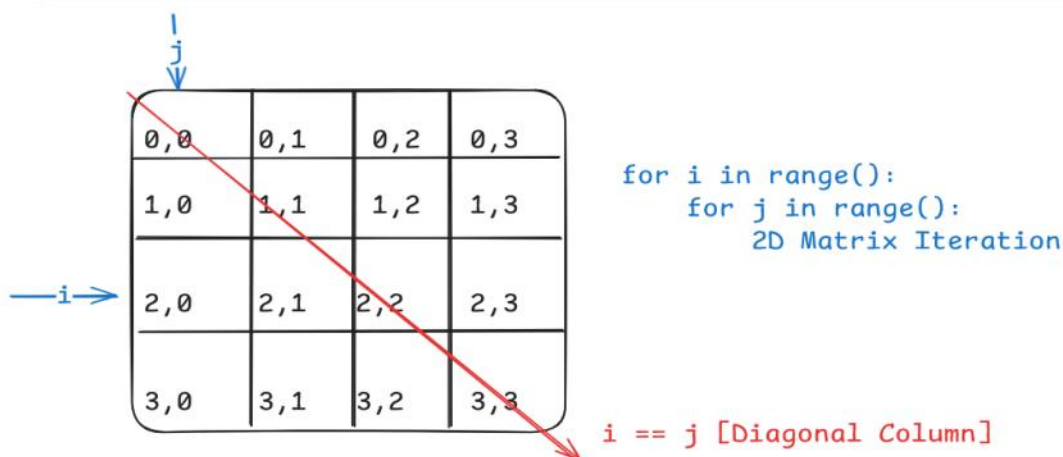# Looping Statement - II

🎯 Session Objectives

- ☑ Understand what looping statements are
- ☑ Understand what a for loop is
- ☑ Shorthand for loop (List Comprehension)
- ☑ Understand is nested for/while loop
- ☑ Understand what a while loop is

Syntax : Shorthand for loop (List Comprehension)

```
new_list = [expression for item in iterable (optional condition)]
or
new_list = [expression1 if condition else expression2 for item in iterable]
```

0,0	0,1	0,2	0,3
1,0	1,1	1,2	1,3
2,0	2,1	2,2	2,3
3,0	3,1	3,2	3,3

```
for i in range():
    for j in range():
        2D Matrix Iteration
```

i == j [Diagonal Column]

```
nested_list = [[i*j for i in range(4)] for j in range(4)]
nested_list
```

```
[[0, 0, 0, 0], [0, 1, 2, 3], [0, 2, 4, 6], [0, 3, 6, 9]]
```

idx

```
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
new_car_list = []
stop = len(car_list) # 14
print(stop)
for idx in range(stop): # [0,1,2,......13]
    print(idx , end = ' ')
    new_car_list.append(car_list[idx])
print()
print(new_car_list)
```

Memory

```
new_car_list = [Taigun,Slavia,Verna,]

stop = 14
                    i
                    ↓
range(stop) = [0,1,2,3,4,5,6,7,8,9,10,11,12,13]

idx = None
                0   1   2
```

Console

```
14
0 1 2 3
```

```python
# Range(start,stop,step)
car_tuple = ('Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq')
for car in car_tuple:
    print(car, end = " ")
```

```
Taigun Slavia Verna Thar Innova Defender Virtus Creta Safari Harrier Bolero XUV700 Altroz Kushaq
```

```python
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
stop = len(car_list) # 14
print(stop)
for car in range(stop): # [0,1,2,......13]
    print(car , end = ' ')
    print(car_list[car])
```

```
14
0 Taigun
1 Slavia
2 Verna
3 Thar
4 Innova
5 Defender
6 Virtus
7 Creta
8 Safari
9 Harrier
10 Bolero
11 XUV700
12 Altroz
13 Kushaq
```

```python
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
new_car_list = []
stop = len(car_list) # 14
print(stop)
for idx in range(stop): # [0,1,2,......13]
    print(idx , end = ' ')
    new_car_list.append(car_list[idx])
print()
print(new_car_list)
```

```
14
0 1 2 3 4 5 6 7 8 9 10 11 12 13
['Taigun', 'Slavia', 'Verna', 'Thar', 'Innova', 'Defender', 'Virtus', 'Creta', 'Safari', 'Harrier', 'Bolero',
 'XUV700', 'Altroz', 'Kushaq']
```

```python
# Filling Alternative Car_list
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
alt_car_list = []
stop = len(car_list) # 14
print(stop)
for idx in range(0,stop,2): # [0 2 4 6 8 10 12]
    print(idx , end = ' ')
    alt_car_list.append(car_list[idx])
print()
print(alt_car_list)
```
```
14
0 2 4 6 8 10 12
['Taigun', 'Verna', 'Innova', 'Virtus', 'Safari', 'Bolero', 'Altroz']
```

```python
# Filling Alternative Car_list
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
alt_car_list = []
stop = len(car_list) # 14
print(stop)
for idx in range(1,stop,2): # [1 3 5 7 9 11 13]
    print(idx , end = ' ')
    alt_car_list.append(car_list[idx])
print()
print(alt_car_list)
```
```
14
1 3 5 7 9 11 13
['Slavia', 'Thar', 'Defender', 'Creta', 'Harrier', 'XUV700', 'Kushaq']
```

```python
# Filling Car_list in reverse order
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
rev_car_list = []
stop = len(car_list) # 14
print(stop)
for idx in range(stop-1,-1,-1): # [13,12,11.....0]
    print(idx , end = ' ')
    rev_car_list.append(car_list[idx])
print()
print(rev_car_list)
```
```
14
13 12 11 10 9 8 7 6 5 4 3 2 1 0
['Kushaq', 'Altroz', 'XUV700', 'Bolero', 'Harrier', 'Safari', 'Creta', 'Virtus', 'Defender', 'Innova', 'Thar',
'Verna', 'Slavia', 'Taigun']
```

```python
# Filling Car_list in reverse order
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
rev_car_list = []
stop = len(car_list) # 14
print(stop)
for idx in range(stop-1,-1,-2): # [13,11,9,7....1]
    print(idx , end = ' ')
    rev_car_list.append(car_list[idx])
print()
print(rev_car_list)
```

```
14
13 11 9 7 5 3 1
['Kushaq', 'XUV700', 'Harrier', 'Creta', 'Defender', 'Thar', 'Slavia']
```

```python
# Looping with enumerate() => (idx,item)
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
enumerate(car_list)
```

```
<enumerate at 0x22198f7f740>
```

```python
tuple(enumerate(car_list))
```

```
((0, 'Taigun'),
 (1, 'Slavia'),
 (2, 'Verna'),
 (3, 'Thar'),
 (4, 'Innova'),
 (5, 'Defender'),
 (6, 'Virtus'),
 (7, 'Creta'),
 (8, 'Safari'),
 (9, 'Harrier'),
 (10, 'Bolero'),
 (11, 'XUV700'),
 (12, 'Altroz'),
 (13, 'Kushaq'))
```

```python
for idx, car_name in enumerate(car_list): # Unpacking a tuple
    print(idx, car_name)
```
```
0 Taigun
1 Slavia
2 Verna
3 Thar
4 Innova
5 Defender
6 Virtus
7 Creta
8 Safari
9 Harrier
10 Bolero
11 XUV700
12 Altroz
13 Kushaq
```

```python
dict(enumerate(car_list))
```
```
{0: 'Taigun',
 1: 'Slavia',
 2: 'Verna',
 3: 'Thar',
 4: 'Innova',
 5: 'Defender',
 6: 'Virtus',
 7: 'Creta',
 8: 'Safari',
 9: 'Harrier',
 10: 'Bolero',
 11: 'XUV700',
 12: 'Altroz',
 13: 'Kushaq'}
```

```python
list(enumerate(car_list))
```
```
[(0, 'Taigun'),
 (1, 'Slavia'),
 (2, 'Verna'),
 (3, 'Thar'),
 (4, 'Innova'),
 (5, 'Defender'),
 (6, 'Virtus'),
 (7, 'Creta'),
 (8, 'Safari'),
 (9, 'Harrier'),
 (10, 'Bolero'),
 (11, 'XUV700'),
 (12, 'Altroz'),
 (13, 'Kushaq')]
```

```python
# Looping with enumerate() => (idx,item)
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
for idx , car_name in enumerate(car_list):
    print(car_list[idx] , end = " ")
print()
for idx , car_name in enumerate(car_list):
    print(car_name , end = " ")
```

```
Taigun Slavia Verna Thar Innova Defender Virtus Creta Safari Harrier Bolero XUV700 Altroz Kushaq
Taigun Slavia Verna Thar Innova Defender Virtus Creta Safari Harrier Bolero XUV700 Altroz Kushaq
```

```python
_dict = {
    'name' : 'Mohit',
    'age' : 29,
    'gender' : 'Male',
    'city' : 'Goa',
    'country' : 'India'
}
_dict.keys()
```

```
dict_keys(['name', 'age', 'gender', 'city', 'country'])
```

```python
_dict.values()
```

```
dict_values(['Mohit', 29, 'Male', 'Goa', 'India'])
```

```python
_dict.items()
```

```
dict_items([('name', 'Mohit'), ('age', 29), ('gender', 'Male'), ('city', 'Goa'), ('country', 'India')])
```

```python
for key, value in _dict.items():
    print((key,value))
```

```
('name', 'Mohit')
('age', 29)
('gender', 'Male')
('city', 'Goa')
('country', 'India')
```

```python
a,b,*c = 1,2,3,4,5,6,7,8,9,10 # unpacking a tuple
print(a) # 1
print(b) # 2
print(c) # [3,4,5,6,7,8,9,10]
```

```
1
2
[3, 4, 5, 6, 7, 8, 9, 10]
```

```
# Else in For Loop:
for x in range(1,11):
    print(x , end = ' ') # [1,2,3,4...10]
else:
    print()
    print("Loop Ended Successfully..")
```
```
1 2 3 4 5 6 7 8 9 10
Loop Ended Successfully..
```
```
# Break statement -> tries to break the loop abruptly...
# Else in For Loop:
for x in range(1,11):
    print(x , end = ' ') # [1,2,3,4...7]
    if x == 7:
        break
else: # Else Block Won't Run as the above loops break abruptly ✗
    print()
    print("Loop Ended Successfully..")
```
```
1 2 3 4 5 6 7
```

```
# Break statement -> tries to break the loop abruptly...
# Else in For Loop:
for x in range(1,11):
    print(x , end = ' ') # [1,2,3,4...10]
    if x == 10:
        break
else: # In this scenario it will run
    print()
    print("Loop Ended Successfully..")
```
```
1 2 3 4 5 6 7 8 9 10
```
```
# Break statement -> tries to break the loop abruptly...
# Else in For Loop:
for x in range(1,11):
    print(x , end = ' ') # [1,2,3,4...10]
    if x == 11:
        break
else: # In this scenario it will run
    print()
    print("Loop Ended Successfully..")
```
```
1 2 3 4 5 6 7 8 9 10
Loop Ended Successfully..
```

```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(2,n):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  16
2 4 8
```
```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  16
1 2 4 8 16
```

```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  12
1 2 3 4 6 12
```
```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  65
1 5 13 65
```

```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  10000
1 2 4 5 8 10 16 20 25 40 50 80 100 125 200 250 400 500 625 1000 1250 2000 2500 5000 10000
```
```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  111
1 3 37 111
```

```
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if n % i == 0:
        print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  11
1 11
```
```
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if i>=90:
        break
    elif n % i == 0:
        print(i, end = " ")
else:
    print()
    print("Loop Run Successfully.")
```
```
Enter the value of 'n' to calculate its factors:  21
1 3 7 21
Loop Run Successfully.
```

```
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
for i in range(1,n+1):
    if i>=90:
        break
    elif n % i == 0:
        print(i, end = " ")
else:
    print()
    print("Loop Run Successfully.")
```
```
Enter the value of 'n' to calculate its factors:  121
1 11
```

```
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
if n < 0 : # negative
    for i in range(n,0): # [n,n-1,n-2,.....-1]
        if n % i == 0:
            print(i, end = " ")
else: # positive
    for i in range(1,n+1):
        if n % i == 0:
            print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  -16
-16 -8 -4 -2 -1
```

```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
if n < 0 : # negative
    for i in range(n,0): # [n,n-1,n-2,.....-1]
        if n % i == 0:
            print(i, end = " ")
else: # positive
    for i in range(1,n+1):
        if n % i == 0:
            print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  -99
-99 -33 -11 -9 -3 -1
```

```python
# Print all the factors of 'n':
n = int(input("Enter the value of 'n' to calculate its factors: "))
if n < 0 : # negative
    for i in range(n,0): # [n,n-1,n-2,.....-1]
        if n % i == 0:
            print(i, end = " ")
else: # positive
    for i in range(1,n+1):
        if n % i == 0:
            print(i, end = " ")
```
```
Enter the value of 'n' to calculate its factors:  77
1 7 11 77
```
```python
# Syntax : Shorthand for loop (List Comprehension)
new_list = [expression for item in iterable (optional condition)]
or
new_list = [expression1 if condition else expression2 for item in iterable]
```

```python
_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
# max_value = _list[0]
max_value = float('-inf')
for val in _list:
    if val > max_value:
        max_value = val

print(max_value)
```
```
1221
```

```python
# new_list = [expression1 if condition else expression2 for item in iterable]
# Walrus Operator : ':=' [Assigning Value]
_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
max_value = _list[0]
[max_value := x if x>max_value else max_value for x in _list]
max_value
```
```
1221
```

```python
# new_list = [expression1 if condition else expression2 for item in iterable]
# Walrus Operator : ':=' [Assigning Value]
_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
max_value = _list[0]
[x if x>max_value else max_value for x in _list]
print(max_value)
```

```
55
```

```python
num_list = [1,2,3,4,5,6,7,8,9,10,11]
squared = [x**2 for x in num_list]
squared
```

```
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121]
```

```python
num_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
add_100 = [x+100 for x in num_list]
add_100
```

```
[155, 199, 221, 191, 1099, 23, 100, 1321, 177, 129, 200, 101, 105]
```

```python
# new_list = [expression for item in iterable (optional condition)]
num_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
even_list = [x for x in num_list if x % 2 == 0]
even_list
```

```
[False, 100]
```

```python
# new_list = [expression for item in iterable (optional condition)]
num_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
odd_list = [x for x in num_list if x % 2 != 0]
odd_list
```

```
[55, 99, 121, 91, 999, -77, 1221, 77, 29, 1, 5]
```

```python
# new_list = [expression for item in iterable (optional condition)]
num_list = [55,99,121,91,999,-77,False,1221,77,29,100,1,5]
odd_list = []
even_list = []
for val in num_list:
    if val % 2 != 0:
        odd_list.append(val)
    else:
        even_list.append(val)

print(odd_list)
print(even_list)
```

```
[55, 99, 121, 91, 999, -77, 1221, 77, 29, 1, 5]
[False, 100]
```

```python
# Replaces the elements conditionally
# [expression1 if condition else expression2 for item in iterable]
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
new_car_list = [car if car != 'Harrier' else 'Curvv' for car in car_list]
print(new_car_list , end = " ")
```

```
['Taigun', 'Slavia', 'Verna', 'Thar', 'Innova', 'Defender', 'Virtus', 'Creta', 'Safari', 'Curvv', 'Bolero', 'X
UV700', 'Altroz', 'Kushaq']
```

```python
# Replaces the elements conditionally
# [expression1 if condition else expression2 for item in iterable]
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
new_car_list = []
for car in car_list:
    if car != 'Harrier':
        new_car_list.append(car)
    else:
        new_car_list.append('Curvv')
print(new_car_list , end = " ")
```

```
['Taigun', 'Slavia', 'Verna', 'Thar', 'Innova', 'Defender', 'Virtus', 'Creta', 'Safari', 'Curvv', 'Bolero', 'X
UV700', 'Altroz', 'Kushaq']
```

```python
# Replaces the elements conditionally
# [expression1 if condition else expression2 for item in iterable]
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
new_car_list = []
for car in car_list:
    if car == 'Harrier':
        new_car_list.append('Curvv')
    else:
        new_car_list.append(car)
print(new_car_list , end = " ")
```

```
['Taigun', 'Slavia', 'Verna', 'Thar', 'Innova', 'Defender', 'Virtus', 'Creta', 'Safari', 'Curvv', 'Bolero', 'X
UV700', 'Altroz', 'Kushaq']
```

```python
# Multiple List in Comprehensions:
# Syntax : [exp1 for item1 in itr1 for item2 in itr2..... if condition ]
[(i,j) for i in range(4) for j in range(4)] # [0,1,2,3] [4X4 Matrix]
```

```
[(0, 0),
 (0, 1),
 (0, 2),
 (0, 3),
 (1, 0),
 (1, 1),
 (1, 2),
 (1, 3),
 (2, 0),
 (2, 1),
 (2, 2),
 (2, 3),
 (3, 0),
 (3, 1),
 (3, 2),
 (3, 3)]
```

```python
# Multiple List in Comprehensions:
# Syntax : [exp1 for item1 in itr1 for item2 in itr2..... if condition ]
# i == j [Diagonal Matrix]
[(i,j) for i in range(4) for j in range(4) if i==j] # [0,1,2,3] [4X4 Matrix]
```

```
[(0, 0), (1, 1), (2, 2), (3, 3)]
```

```python
nested_list = [[i*j for i in range(4)] for j in range(4)]
nested_list
```

```
[[0, 0, 0, 0], [0, 1, 2, 3], [0, 2, 4, 6], [0, 3, 6, 9]]
```

```python
# Generator Expression: -> () or []
squared_generator = (x**2 for x in range(1,6)) # [1,2,3,4,5]
print(squared_generator)
```

```
<generator object <genexpr> at 0x00000221987A9630>
```

```python
# tuple
tuple(squared_generator)
```

```
(1, 4, 9, 16, 25)
```

```python
# List
list(squared_generator) # []
```

```
[]
```

```python
# Generator Expression: -> () or []
add_10_generator = (x+10 for x in range(1,6)) # [1,2,3,4,5]
print(add_10_generator) # Object
```

```
<generator object <genexpr> at 0x00000221987A8E10>
```

```python
# List
list(add_10_generator)
```

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

```python
# tuple
tuple(add_10_generator) # ()
```

```
()
```

```python
# Dictionary -> Zip(Key, Value)
key_generator = (x for x in range(11,111,11)) # [11,22,33,44,55,66,77,88,99,110]
value_generator = (x**2 for x in range(11,111,11)) # [Square of the above list]
dict(zip(key_generator, value_generator))
```

```
{11: 121,
 22: 484,
 33: 1089,
 44: 1936,
 55: 3025,
 66: 4356,
 77: 5929,
 88: 7744,
 99: 9801,
 110: 12100}
```

```python
car_list = ['Taigun','Slavia','Verna','Thar','Innova','Defender','Virtus','Creta',
            'Safari','Harrier','Bolero','XUV700','Altroz','Kushaq']
print(len(car_list)) # 14
```

```
14
```

```python
count = 0
for car in car_list:
    count+=1

print(count)
```

```
14
```