10. PYTHON – FLOW CONTROL

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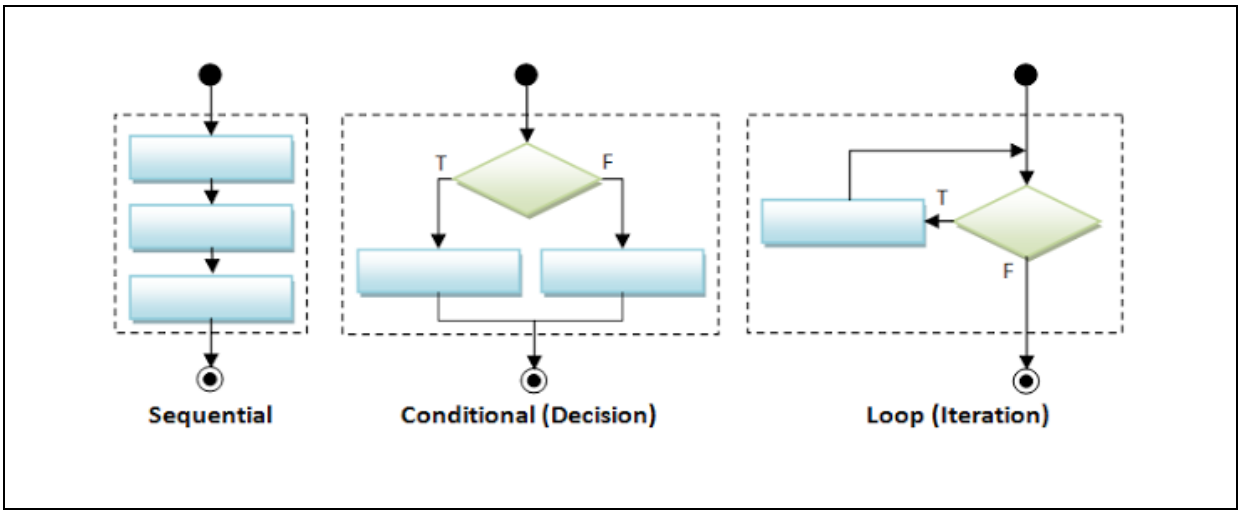
1. Flow control

- ✓ The order of statements execution is called as flow of control.

2. Types of the execution

- ✓ Based on requirement the programs statements can executes in different ways like sequentially, conditionally and repeatedly etc.
- ✓ In any programming language, statements will be executed mainly in three ways,
  - Sequential execution.
  - Conditional execution.
  - Looping execution.



1. Sequential

- ✓ Statements execute from top to bottom, means one by one sequentially.
- ✓ By using sequential statement, we can develop only simple programs.

2. Conditional

- ✓ Based on conditions, statements used to execute.
- ✓ Conditional statements are useful to develop better and complex programs.

3. Looping

- ✓ Based on conditions, statements used to execute randomly and repeatedly.
- ✓ Looping execution is useful to develop better and complex programs.

3. Sequential statements

Program Name: sequential statement: executes from top to bottom
demo1.py

```
print("one")
print("two")
print("three")
```

output

```
one
two
three
```

2. Conditional or Decision-making statements

- if - valid combination
- if else - valid combination
- if elif else - valid combination
- if elif elif else - valid combination

3. Looping

- ✓ for loop
- ✓ while loop

4. Other keywords

- ✓ break
- ✓ continue
- ✓ pass

4. Indentation

- ✓ Python uses indentation to indicate a block of code.
- ✓ Indentation refers to adding white space before a statement to a particular block of code.
- ✓ Python uses 4 spaces as indentation by default.
    - o However, the number of spaces is up to you, but a minimum of 1 space has to be used.

4.1 IndentationError

- ✓ If we didn't follow the proper indentation then we will get error as **IndentationError**: expected an indented block

5. Conditional or Decision-making statements

5.1 if statement

syntax

```
if condition:
    if block statements

out of if block statements
```

- ✓ **if** is a keyword in python
- ✓ **if** statement contains an expression/condition/value.
- ✓ As per the syntax colon (:) is mandatory otherwise it throws syntax error.
- ✓ After **if** statement we need to follow indentation otherwise it throws IndentationError.
- ✓ Condition gives the result as a bool type, means either **True** or **False**.

- ✓ If the condition result is **True**, then **if** block statements will be executed
- ✓ If the condition result is **False**, then **if** block statements won't execute.

Program Name: Executing if block statements by using if statement
demo2.py

```
x = 1
y = 1

print("x==y value is: ", (x==y))
if x == y:
        print("if block statements executed")
```

output

```
x==y value is: True
if block statements executed
```

Program Name: Executing out of if block statements
demo3.py

```
x = 1
y = 2

print("x==y value is: ", (x==y))
if x == y:
        print("if block statements executed")
print("out of if block statements")
```

output

```
x==y value is: False
out of if block statements
```

5.2 if else statement

syntax

```
if condition:
    if block statements1

else:
    else block statements2
```

- ✓ **if** and **else** are keywords in python
- ✓ **if** statement contains an expression/condition.
- ✓ As per the syntax colon (**:**) is mandatory otherwise it throws syntax error.
- ✓ After **if** and **else** statements we need to follow indentation otherwise it throws IndentationError.
- ✓ Condition gives the result as bool type, means either **True** or **False**

- ✓ If the condition result is **True**, then **if** block statements will be executed
- ✓ If the condition result is **False**, then **else** block statements will be executed.

Program Name: Executing if block statements by using if else statement
demo4.py

```
x = 1
y = 1

print("x==y value is: ", (x==y))

if x == y:
        print("if block statements executed")
else:
        print("else block statements executed")
```

output

```
x==y value is: True
if block statements executed
```

Program Name: printing else block statements
demo5.py

```
x = 1
y = 2

print("x==y value is: ", (x == y))

if x == y:
        print("if block statements executed")
else:
        print("else block statements executed")
```

output

```
x==y value is: False
else block statements executed
```

5.3 if elif else statement

syntax

```
if condition1:
        if block statements

elif condition2:
        elif block1statements

elif condition3:
        elif block2statements

else:
        else block statements
```

- ✓ **if**, **elif** and **else** are keywords in python
- ✓ **if** statement contains an expression/condition.
- ✓ As per the syntax colon (:) is mandatory otherwise it throws error.
- ✓ After **if**, **elif** and **else** statements we need to follow indentation otherwise it throws IndentationError.
- ✓ Condition gives the result as bool type, means either **True** or **False**

- ✓ If the condition result is **True**, then any matched **if** or **elif** block statements will execute.
- ✓ If all **if** and **elif** conditions results are **False**, then **else** block statements will execute.

Make a note

- ✓ Here, else part is an optional

Program Name: printing corresponding value by using if, elif, else statements
demo6.py

```
print("Please enter the values from 0 to 4")
x = int(input("Enter a number: "))

if x == 0:
        print("You entered:", x)

elif x == 1:
        print("You entered:", x)

elif x == 2:
        print("You entered:", x)

elif x == 3:
        print("You entered:", x)

elif x == 4:
        print("You entered:", x)

else:
        print("Beyond the range than specified")
```

output

```
Enter a number: 1
You entered: 1

Enter a number: 100
Beyond the range than specified
```

6. Looping

- ✓ If we want to execute a group of statements in multiple times, then we should go for looping kind of execution.
  - for loop
  - while loop

6.1 for loop

- ✓ **for** is a keyword in python
- ✓ Basically, **for** loop is used to get or iterate elements one by one from sequence like string, list, tuple, etc…
- ✓ While iterating elements from sequence we can perform operations on every element.

Syntax

```
for variable in sequence:
    statements
```

Program Name: Using for loop printing value from list
demo7.py

```
values = [10, 20, 30, "Daniel"]
for value in values:
    print(value)
```

output

```
10
20
30
Daniel
```

6.2 while loop

- ✓ **while** is a keyword in python
- ✓ If we want to execute a group of statements repeatedly until the condition reaches to False, then we should go for **while** loop.

Syntax

```
Initialization
while condition:
        while block statements
        increment/decrement
```

- ✓ **while** loop contains an expression/condition.
- ✓ As per the syntax colon (:) is mandatory otherwise it throws syntax error.
- ✓ After **while** loop we need to follow indentation otherwise it throws IndentationError.
- ✓ Condition gives the result as bool type, means either **True** or **False**

- ✓ If the condition result is **True**, then while loop executes till the condition reaches to **False**.
- ✓ If the condition result is **False**, then **while** loop execution terminates.

Conclusion

- ✓ Till condition is True the while loop statements will be executed.
- ✓ If the condition reaches to False, then while loop terminate the execution.

Program Name: Printing numbers from 1 to 5 by using while loop
demo8.py

```
x = 1
while x <= 5:
        print(x)
        x = x+1

print("End")
```

output

```
1
2
3
4
5
End
```

7. break statement

- ✓ **break** is a keyword in python
- ✓ The **break** statement can be used inside the loops.
- ✓ By using break we can break the execution based on some condition.
- ✓ Generally, **break** statement is used to terminate **for** and **while** loops.

Program Name: while loop without break
demo9.py

```
x = 1
while x<=10:
        print("x=", x)
        x = x + 1

print("out of loop")
```

output

```
x= 1
x= 2
x= 3
x= 4
x= 5
x= 6
x= 7
x= 8
x= 9
x= 10
out of loop
```

Program Name: printing just 1 to 5 by using while loop and break
demo10.py

```
x = 1
while x <= 10:
        print("x=", x)
        x = x+1
        if x == 5:
                break

print("out of the loop")
```

output

```
x= 1
x= 2
x= 3
x= 4
out of the loop
```

Program Name: break without loop
demo11.py

```
x = 1
if x <= 10:
        print(x)
        break
```

output

```
SyntaxError: 'break' outside loop
```

8. continue statement

- ✓ **continue** is a keyword in python
- ✓ We can use continue statement to skip current iteration and continue next iteration.

```
Program Name    continue statement
                demo12.py

                cart = [10, 20, 500, 700, 50, 60]
                for item in cart:
                        if item == 500:
                                continue
                        print(item)

output
                10
                20
                700
                50
                60
```

```
Program Name    continue without loop
                demo13.py

                x = 1
                if x <= 10:
                        continue

                print(x)

output

                SyntaxError: 'continue' not properly in loop
```

9. pass statement

- ✓ **pass** is keyword in python.
- ✓ The pass statement is used as a placeholder for future code.
- ✓ It is useful as a placeholder when a statement is required syntactically, but no code needs to be executed.
- ✓ pass is a null operation, when it is executed, nothing happens.
- ✓ We can define an empty function, class, method with pass statement.

Program Name: Function without pass statement
demo14.py

```
def upcoming_sales():

upcoming_sales()
```

output

```
IndentationError: expected an indented block
```

Program Name: Function with pass statement
demo15.py

```
def upcoming_sales():
        pass

upcoming_sales()
```

output

Make a note

- ✓ We can even define a method or block of code with pass statement.