St. Francis Institute of Technology, Mumbai-400 103
Department Of Information Technology

A.Y. 2023-24
Class: SE-ITA/B, Semester: IV

Subject: Python Lab

Experiment – 4: Python Looping

1. **Aim:** To implement a Python program to demonstrate looping statements while and for
   - **i)** Write a program to print all natural numbers between 1 to 100 using looping statements
   - **ii)** Write a program to find the sum of natural numbers up to n, where n is provided by the user.
   - **iii)** Write a python program to read marks of 3 subjects of 10 students and print total marks and average of each student. Also print the message if average is greater than 50 they are "pass"
   - **iv)** Print Pattern (any star pattern) using for or while loop

2. **Objectives:** After performing this experiment, the student will be able to understand and write looping statements in Python.
3. **Outcomes:** Students shall be able to understand the structure, syntax and semantics of a Python program. (LO-404.1).
4. **Prerequisite:** Knowledge of python data types, Basics of looping structures.
5. **Requirements:** Personal Computer (PC), Windows /Linux Operating System, Python IDE.
6. **Pre-Experiment Exercise:**

Theory:

Python Looping statements:

i. While loop: It is indefinite type of a loop. It repeats a statement or group of statements while a given condition is TRUE. It tests the condition before executing the loop body.

```
while test:                 # Loop test
    statements              # Loop body
else:                       # Optional else
   statements               # Run if didn't exit loop with break
```

ii. For loop: It is definite type of loop. It executes a sequence of statements multiple times and abbreviates the code that manages the loop variable.

```
for target in object:       # Assign object items to target
    statements              # Repeated loop body: use target
else:                       # Optional else part
    statements              # If we didn't hit a 'break'
```

7. **Laboratory Exercise**
   - **A. Procedure**
     i. Open IDLE IDE for Python programming
     ii. Open new Python file from menu file-new

iii. Type Python code with proper syntax
iv. Save file with .py extension
v. Execute the command statements inside the saved file using cntr+enter key and explore results in other windows of IDLE.

B. Program code with comments:

Write and execute your program code to achieve the given aim and attach it with your own comments with neat indentation.

8. Post-Experiments Exercise

A. Extended Theory:

1. Draw 'For' Or 'While' loop flowchart.
2. How to use 'range()' function with 'for' loop, give syntax.

B. Results/Observations/Program output:

Present the program input/output results and comment on the same.

C. Questions/Programs:

1. Write a Python program to print a multiplication table of a number given by the user.
2. Write a Python program to print Fibonacci series of 10 numbers using a while/for loop.
3. Write a program to calculate factorial of a given number using a for loop.
4. Write a program to print a number in reverse order.

D. Conclusion:

1. Write what was performed in the experiment/program.
2. What is the significance of experiment/program?
3. Mention a few applications of what was studied.

E. References

[1] MT Savaliya, "Programming through Python",StarEdu Solutions India Pvt.
[2] Zed A. Shaw "LEARN PYTHON THE HARD WAY" Addison Wesley
[3] https://www.python.org/
[4] www.pythonforbeginners.com

In-Lab Program

a.Write a Python program to to print all natural numbers between 1 to 100 using looping statements

Code:

```
#Using for Loop
print("\nUsing for Loop")
for i in range(1,101):
    print(i, end=" ")

#Using while Loop
print("\n\nUsing while Loop")
i=1
while i<=100:
    print(i, end=" ")
    i+=1
```

Output :

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python .\1_to_100_using_loop.py

Using for Loop
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67
68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
100

Using while Loop
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67
68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
100

PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4>
```

b.Write a program to find the sum of natural numbers up to n, where n is provided by the user.

Code :

```
num=int(input("Enter number upto which sum is to be Calculated:
"))
print("\nUsing While Loop")
if num<0:
    print("Enter a Positive Integer")
else:
    temp=num
    sum=0
    while temp >0:
        sum=sum+temp
        temp=temp-1
    print("Sum of Number from 1 to",num,"is",sum)
print("\nUsing For Loop")
sum=0
if num<0:
    print("Enter a Positive Integer")
else:
    for i in range(1,num+1):
        sum=sum+i
    print("Sum of Number from 1 to",num,"is",sum)
```

Output:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python  .\sum_of_natural_number_
up_to_user_inputed.py
WAP to find the sum of natural numbers up to n,where n is provided  by the user.
Enter number upto which sum is to be Calculated: 5

Using While Loop
Sum of Number from 1 to 5 is 15

Using For Loop
Sum of Number from 1 to 5 is 15
```

C. Write a python program to read marks of 3 subjects of 10 students and print total marks and average of each student. Also print the message if average is greater than 50 they are “pass”

Code: (Using For Loop)

```
for i in range(0,10):
    print("\nStudent",i+1)
    total=0

    for j in range(0,3):
        marks=int(input("Enter the marks of Subject"+str(j+1)+":
"))
        total=total+marks
    average=total/3

    print("Total Marks of Student",i+1,"is",total)
    print("Average Marks of Student",i+1,"is",average)
    if average>50:
        print("Student is Pass")
    else:
        print("Student is Fail")
    print("\n")
```

Output:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python .\read_3_subject_marks.py

Using For Loop
Student 1
Enter the marks of Subject 1: 50
Enter the marks of Subject 2: 63
Enter the marks of Subject 3: 66
Total Marks of Student 1 is 179
Average Marks of Student 1 is 59.666666666666664
Student is Pass
Student 2
Enter the marks of Subject 1: 50
Enter the marks of Subject 2: 20
Enter the marks of Subject 3: 56
Total Marks of Student 2 is 126
Average Marks of Student 2 is 42.0
Student is Fail
```

Code (Using While Loop)

```
print("\nUsing While Loop")
i=0
while i<10:
    print("\nStudent",i+1)
    total=0
    j=0
    while j<3:
        marks=int(input("Enter the marks of Subject"+str(j+1)+":
"))
        total=total+marks
        j+=1
    average=total/3

    print("Total Marks of Student",i+1,"is",total)
    print("Average Marks of Student",i+1,"is",average)
    if average>50:
        print("Student is Pass")
    else:
        print("Student is Fail")
    print("\n")
    i+=1
```

Output:

```
Using While Loop
Student 1
Enter the marks of Subject 1: 50
Enter the marks of Subject 2: 60
Enter the marks of Subject 3: 80
Total Marks of Student 1 is 190
Average Marks of Student 1 is 63.333333333333336
Student is Pass
Student 2
Enter the marks of Subject 1: 50
Enter the marks of Subject 2: 60
Enter the marks of Subject 3: 20
Total Marks of Student 2 is 130
Average Marks of Student 2 is 43.333333333333336
Student is Fail
Student 3
Enter the marks of Subject 1:
```

d. Print Pattern (any star pattern) using for or while loop

Code :

```
#Using for Loop
print("Using for Loop")
for i in range(1,6):
    for j in range(1,i+1):
        print("*",end=" ")
    print("\n")
#Using while Loop
print("Using while Loop")
i=1
while i<=5:
    j=1
    while j<=i:
        print("*",end=" ")
        j+=1
    print("\n")
    i+=1
```

Output:

```
Using for Loop
*

* *

* * *

* * * *

* * * * *

Using while Loop
*

* *

* * *

* * * *

* * * * *
```

Post Experiment Exercise:

1.Write a Python program to print a multiplication table of a number given by the user.

CODE:

```
print("\nWAP to Print  tables using Loops")
table=int(input("Enter the Number to print the table: "))
print("Using For Loop")
n=1
for i in range(0,10):
    print(table,"*",i+1,"is",table*(i+1))
print("\nUsing While Loop")
while (n<=10):
    print(table,"*",n,"is",table*(n))
    n=n+1
```

OUTPUT:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python .\multiplication_table.py

WAP to Print  tables using Loops
Enter the Number to print the table: 5
Using For Loop
5 * 1 is 5
5 * 2 is 10
5 * 3 is 15
5 * 4 is 20
5 * 5 is 25
5 * 6 is 30
5 * 7 is 35
5 * 8 is 40
5 * 9 is 45
5 * 10 is 50

Using While Loop
5 * 1 is 5
5 * 2 is 10
5 * 3 is 15
5 * 4 is 20
5 * 5 is 25
5 * 6 is 30
5 * 7 is 35
5 * 8 is 40
5 * 9 is 45
5 * 10 is 50
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4>
```

2.Write a Python program to print Fibonacci series of 10 numbers using a while/for loop.
CODE:

```
print("Using For Loop")
a=0
b=1
for i in range(0,10):
    print(a , end=" ")
    c=a+b
    a=b
    b=c

print("\nUsing While Loop")
a=0
b=1
i=0
while i<10:
    print(a , end=" ")
    c=a+b
    a=b
    b=c
    i+=1
```

Output:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python .\fibonacci.py
Using For Loop
0 1 1 2 3 5 8 13 21 34
Using While Loop
0 1 1 2 3 5 8 13 21 34
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4>
```

3.Write a program to calculate the factorial of a given number using a for loop.
Code:

```
print("Using For Loop")
num=int(input("Enter the number to calculate the factorial: "))
fact=1
for i in range(1,num+1):
    fact=fact*i
print("Factorial of",num,"is",fact)

print("Using While Loop")
fact=1
i=1
while i<=num:
    fact=fact*i
    i=i+1
print("Factorial of",num,"is",fact)
```

Output:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python .\factorial.py
Using For Loop
Enter the number to calculate the factorial: 5
Factorial of 5 is 120
Using While Loop
Factorial of 5 is 120
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4>
```

4.Write a program to print a number in reverse order.

Code:

```
print("Using For Loop")
num=int(input("Enter the number to print in reverse order: "))
rev=0
temp=num
for i in range(0,len(str(temp))):
    rev=rev*10+temp%10
    temp=temp//10
print("Reverse of the number is",rev)

print("\nUsing While Loop")
rev=0
while num>0:
    rev=rev*10+num%10
    num=num//10
print("Reverse of the number is",rev)
```

Output:

```
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4> python .\reverse.py
Using For Loop
Enter the number to print in reverse order: 63
Reverse of the number is 36

Using While Loop
Reverse of the number is 36
PS F:\College Stuff\Vishal Mahajan SE IT SEM 4\Python Lab\EXP4>
```