SFU SIMON FRASER UNIVERSITY
ENGAGING THE WORLD

CMPT 120: Introduction to Computing Science and Programming 1

Control Structures: Loops

python™

Reminders

One-Stop Access To Course Information

- **Course website: One-stop access** to all course information.

  http://www2.cs.sfu.ca/CourseCentral/120/liaqata/WebSite/index.html

- Course Outline
- Exam Schedule
- Python Info
- CourSys/Canvas link
- Learning Outcomes
- Office Hours
- Textbook links
- and more…
- Grading Scheme
- Lab/Tutorial Info
- Assignments

- **Canvas**: Discussions forum - https://canvas.sfu.ca/courses/39187
- **CourSys**: Assignments submission, grades - www.coursys.sfu.ca

How to Learn in This Course?

A **Attend** Lectures & Labs

R **Read** / review Textbook/Slides/Notes

R **Reflect** and ask Questions

O **Organize** – your learning activities on weekly basis,

and finally…

W **Write** Code, Write Code, and Write Code.

Deliverables

1. Deliverables are due by the given date and time.
2. For the course, we are using IDLE to write and run our Python code.
3. You can use the CSIL lab computers outside your lab hours.
4. Plan ahead your assignments and other deliverables. Computer crash, network problems etc. are not acceptable excuses for delays in deliverables.
5. You may use online Python interpreters for running and testing your codes, such as:

   https://repl.it/languages/Python3

Labs

1. Each lab has an assigned TA.
2. Attend your assigned lab and show your work to your TA for the participation marks.
3. Class enrolments and lab swaps are closed now.

Course Topics

1. General introduction
2. Algorithms, flow charts and pseudocode
3. Procedural programming in Python
4. **Data types and Control Structures**
5. **Fundamental algorithms**
6. **Binary encodings**
7. **Basics of computability and complexity**
8. **Basics of Recursion**
9. **Subject to time availability:**
   - **Basics of Data File management**

Today's Topics

1. Introduction to Loops: Repetition Structures
   a. The `for` Loop: a Count-Controlled Loop
   b. Break & continue
   c. The `while` Loop: a Condition-Controlled Loop
2. In-Class Coding Practice
3. Sentinels
4. Input Validation Loops
5. Nested Loops

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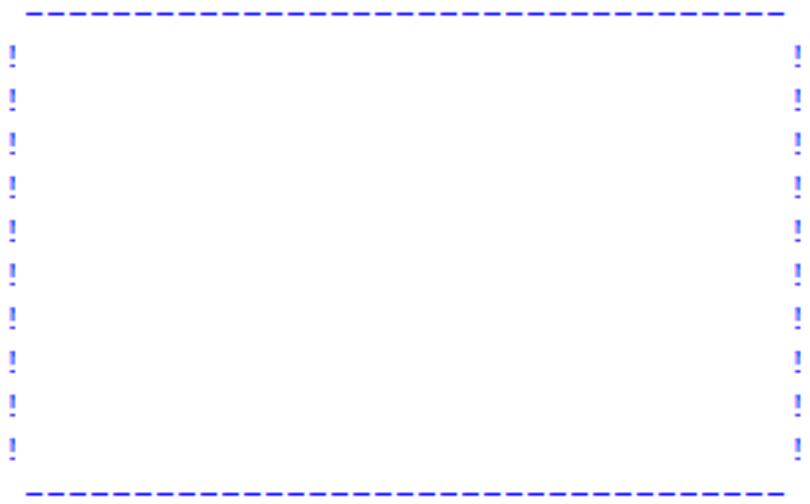
Introduction to Loops: Repetition Structures

Liaqat Ali, Summer 2018.

Introduction to Loops: Repetition Structures

- When we write programs, often we need to write code that performs the same task multiple times.



- print('\t ----------')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t! !')
- print('\t ---------- ----------')

Introduction to Loops: Repetition Structures

- One option is to duplicate the instructions. But, it has disadvantages:
  - _____.
  - _____.
  - _____.
- Programing languages **provide ways** to efficiently handle code duplications.
- We can call these ways as "**Repetition Structures**".
- **Repetition structure**: A repetition structures makes computer repeat the code (included inside the structure) as many times as required.
  1. **count-controlled** loops (**for** loop **i.e., repeat 5 times, 10 times, 100 times etc.**)
  2. **condition-controlled** loops (**while** loop, **repeat as long as some condition is true.**)

Count-Controlled Loop (Definite Loop): for Loop

- **Count-Controlled loop**: A definite loop iterates a specific number of times.
- We use a **`for`** statement to write count-controlled loop.
  - Python **for loop** is designed to work with **sequence of data items**
    - The for loop repeats or iterates once for each item in the sequence.
- General format:

```
for variable in range/list [val1, val2, etc]:
    statements
```

  - We refer to the first line as the _____
  - Inside brackets a sequence of values, separated by comma, appear.

Count-Controlled Loop: Example

- Say, we want to print each name from the following list:

```
friends_list =
['Nick','Sharmin','Akash',
'Albert','Akshay','Yue','V
anessa', 'Justin',
'Jasmine']
```

```
friends_list = ['Nick', 'Sharmin',
'Akash', 'Albert', 'Akshay', 'Yue',
'Vanessa', 'Justin', 'Jasmine']
print(friends_list[0])
print(friends_list[1])
print(friends_list[2])
_____
_____
_____
_____
_____
_____
```

```
friends_list = ['Nick', 'Sharmin',
'Akash', 'Albert', 'Akshay', 'Yue',
'Vanessa', 'Justin', 'Jasmine']
_____:
    _____
•
•
•
•
```

Count-Controlled Loop: Example 2

We can use data values in the **for-clause** as well.

```
for name in ['Nick', 'Sharmin', 'Akash', 'Albert']:
    print(name)
```

Or,

```
for num in [ 1, 2, 3, 4, 5]:
    print(num)
```

Count-Controlled Loop: Example 3

```
friend_list = ['Daewon','Harleen','Da Som','Tsz','Zaid','Yue','Adrian', 'Thomas', 'Wenshu']
```

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In-Class Coding Practice

Count-Controlled Loop: Practice

1. Write a python program to print numbers from 1 and 10.

2. Write a python program to print even numbers from 1 and 10.

3. Write a python program to print even numbers from 1 and 10.

Count-Controlled Loop: range

- We can use the **range** function in for clause to specify a range.
  - The range() can take up to three values as argument.

_____

  - A single value means 'repeat number of times'.

_____

_____

  - Two arguments specify a **from to** range.

_____

_____ **# num takes a value from range (target variable)**

  - Three arguments specify a **from to** range and step value.

_____

_____

Count-Controlled Loop: break & continue

1. With the break statement we can stop the loop before it has looped through all the items.

```
for num in [ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]:
    if num == 6:
        ____________________
    print(num)
```

2. With the continue statement we can stop the current iteration of the loop, and continue with the next:

```
for num in [ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]:
    if num == 6:
        ____________________
    print(num)
```

Class Participation: Printing Tables

- Write a Python program to print a multiplication table using a **for** loop and upload on Canvas by tonight 11:59pm.
- Take input a number from the user.
- Use the for loop to print a multiplication table of the number user entered.
- If user enters 6, then the program output should be as shown on the right.
- You may add comments and appropriate headings.

```
6 x 1 = 6
6 x 2 = 12
6 x 3 = 18
6 x 4 = 24
6 x 5 = 30
6 x 6 = 36
6 x 7 = 42
6 x 8 = 48
6 x 9 = 54
6 x 10 = 60
```

Questions?