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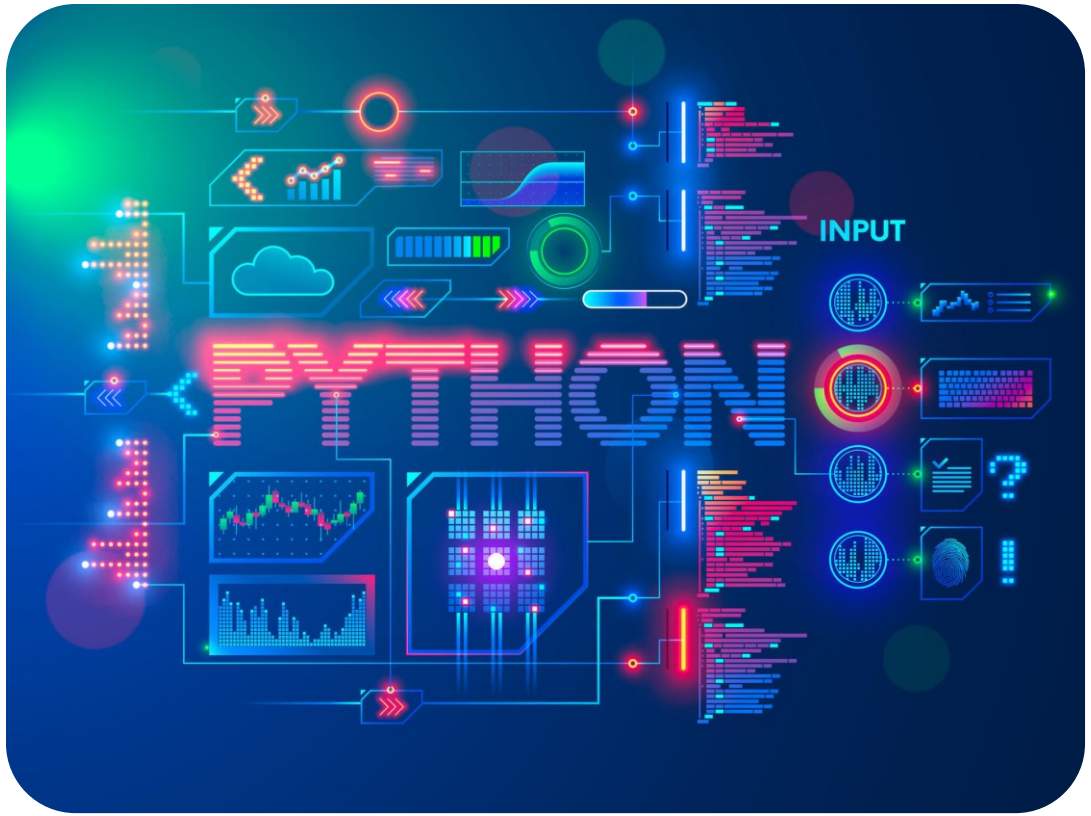


WIIT 7740: Scripting with Python

Week 5: For Loops and While Loops

Expectations Of Your Code

- Docstrings
- Clear, descriptive variable names
- Consistent variable naming convention
  - “snake_case” for variable names
  - “UPPER_SNAKE_CASE” for constants
- Follow instructions precisely
- Fix standard code style issues with PEP8 tools

Expectations Of Your Code: PEP-8 and Style Guide

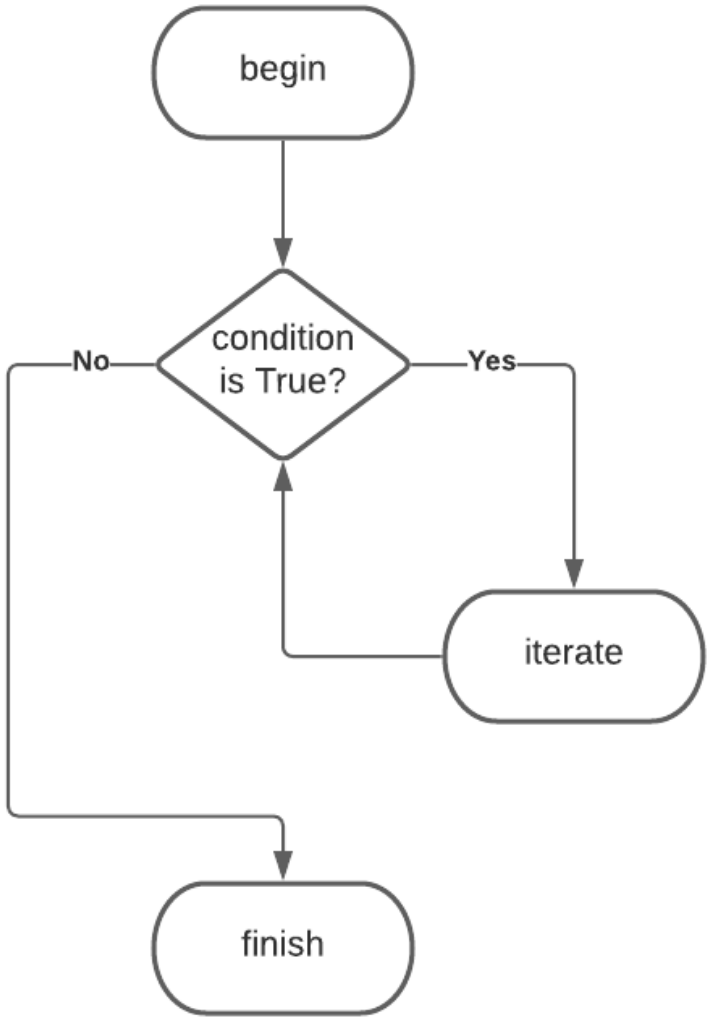
Style Guide:

https://www.python.org/dev/peps/pep-0008/

- Design mistakes into your code on purpose to see what happens
- Be patient with yourself **AND** your computer
- Use Pseudocode to write out your program in plain English
- https://brython.info/

“While” Loops

Used to repeat one or more lines of code (code blocks) “while” a condition holds true:




```
begin()
while condition:
    iterate()
finish()
```

“While” Loop Conditions

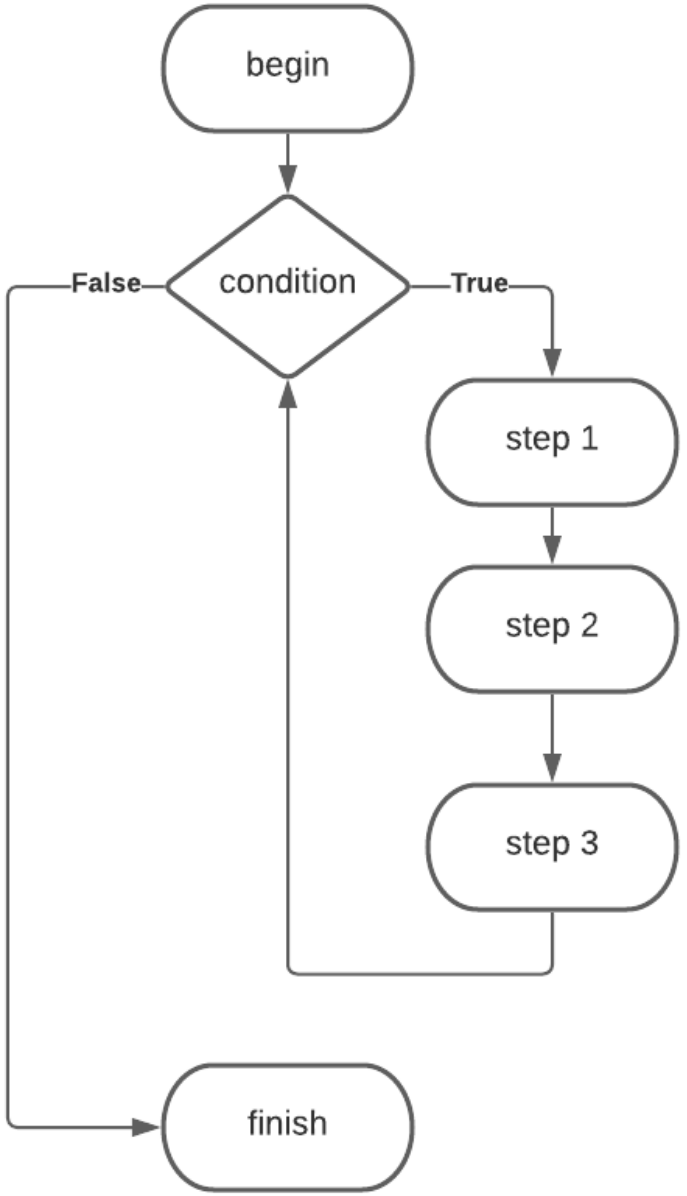
```
while condition:
    # happens 0 or more times
```

is analogous to

```
if condition:
    # happens 0 or 1 time
```

“While” Loop Body

```
begin()
while condition:
    do_step_1()
    do_step_2()
    do_step_3()
finish()
```



Example ”While” Loop

Any expression that produces either True or False can be used:

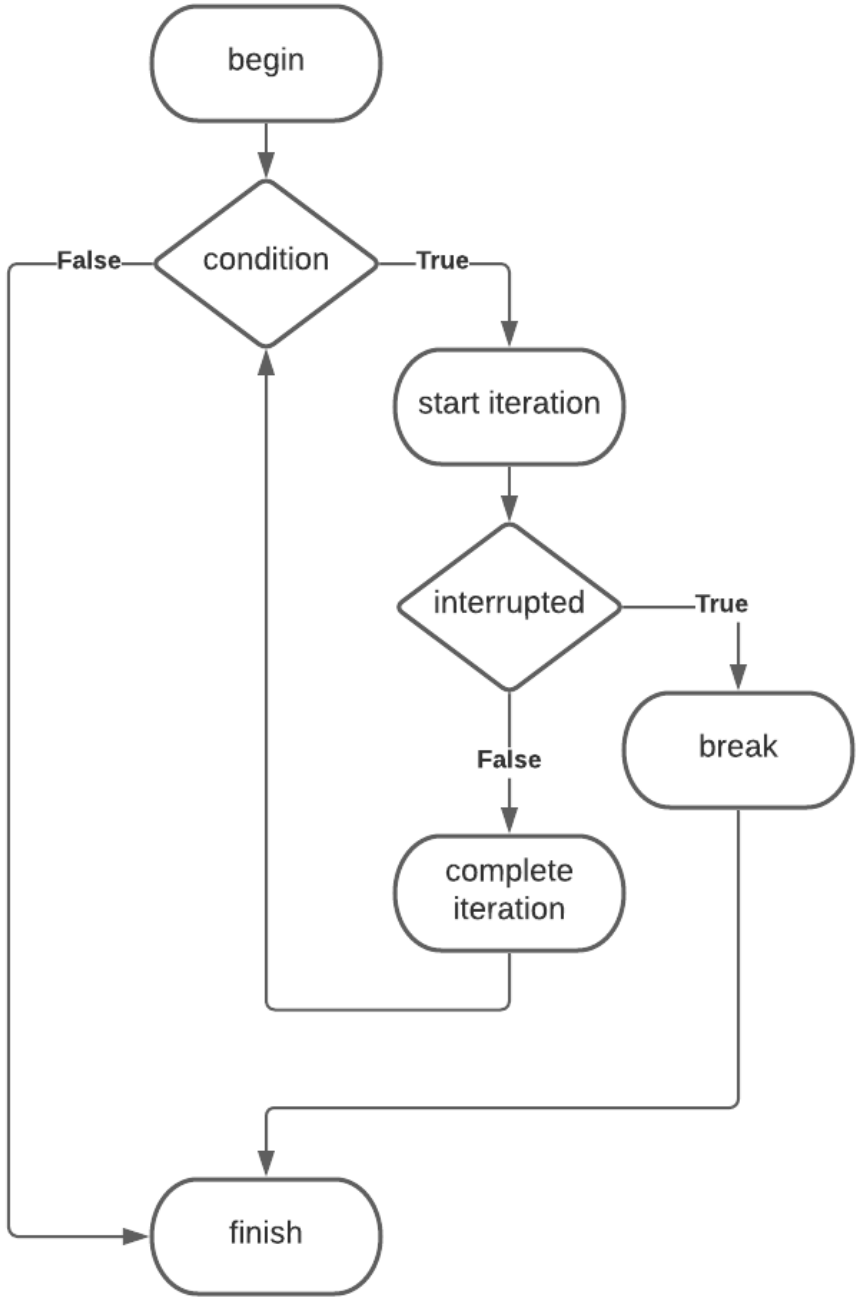
```
n = 10
while n > 0:
    print(n)
    n = n - 1

print('Lift off!')
```

Input Validation Loop

```
is_valid = False
while not is_valid:
    diameter = float(input('Enter diameter'))
    if diameter < 0:
        print('Invalid diameter')
    else:
        is_valid = True
# diameter is a valid value
```

Breaking out of a Loop

```
begin()
while condition:
    start_iteration()
    if interrupted:
        break
    complete_iteration()
finish()
```

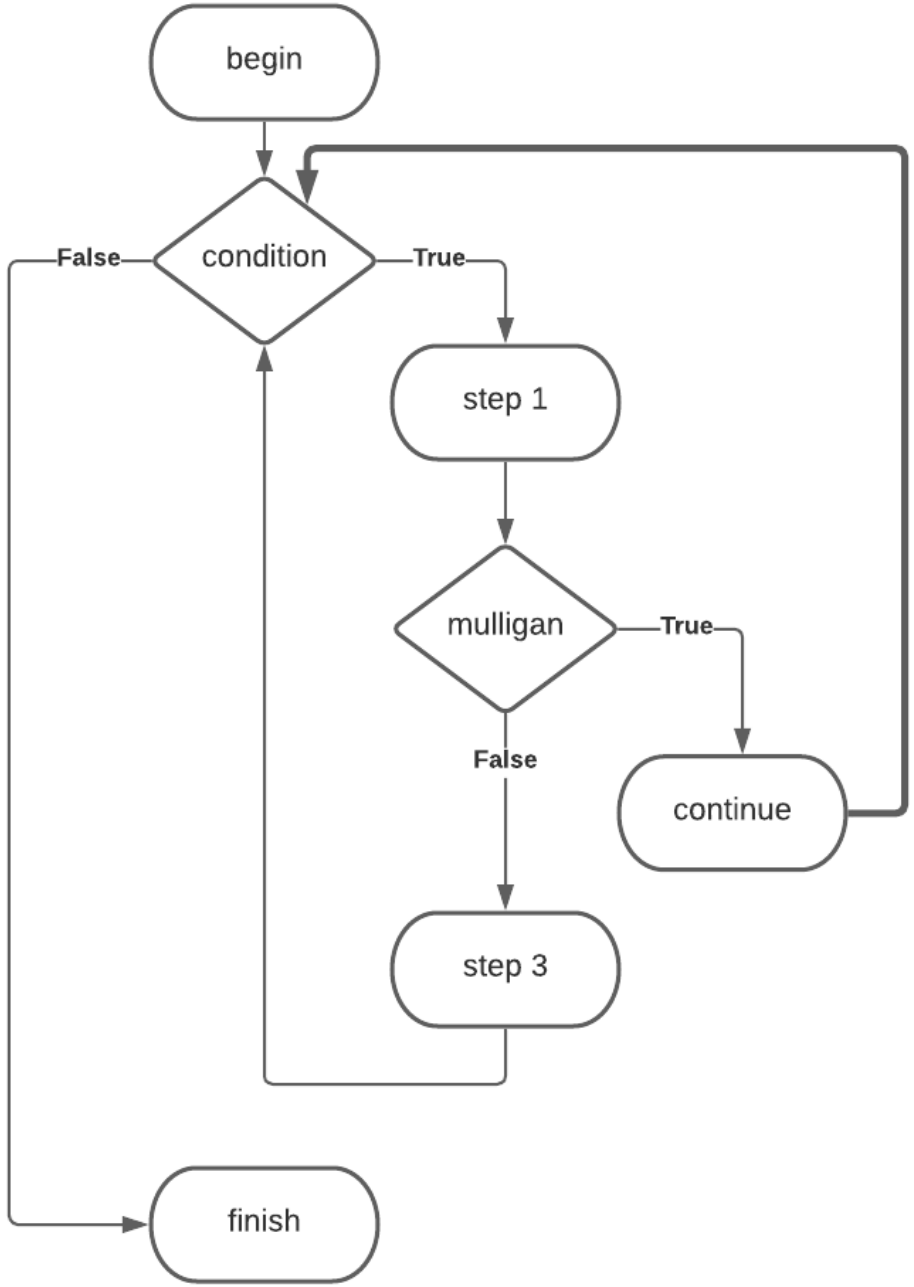


While/Else

```
before_loop()
while condition:
    iterate()
else:
    after_loop()
```

While/Else (continued)

```
begin()
while condition:
    start_iteration()
    if mulligan:
        continue
    complete_iteration()
finish()
```



Iterating List Items with “while”

```
item_index = 0
while item_index < len(items):
    item = items[item_index]
    print('list contains', item)
    item_index += 1
```

Iterating List Items with “for”

No need to deal with an index or length of the list.

```
for item in items
    print('list contains', item)
```

Using the enumerate() function

What if you still want to refer to the index during a “for” loop?

```
for item_index, item in enumerate(items):
    print(
        'list contains',
        item, 'at', item_index
    )
```

Example: Empty List

What will this do?

```
items = []

for item in items:
    print('list contains', item)
```

Range and Range (n)

Range

Returns a range object, which can be converted to a list if needed:

`list(range(3))` will return `[0, 1, 2]`.

Range(n)

- Start at **0**, and go up to, but do not include **n**.
- Loop directly over range, for example:

```
for number in range(3):
    print(number)
```

Range with offset

The first parameter number is inclusive, the second is **NOT** inclusive:

```
for number in range(3, 7):
    print(number)
```

Output:

3

4

5

6

In this case, 3 is printed, but 7 is not due to this property.

Reversed Range

- **`range(start, stop[,step])`** allows the programmer to determine the direction and "step" of the range:

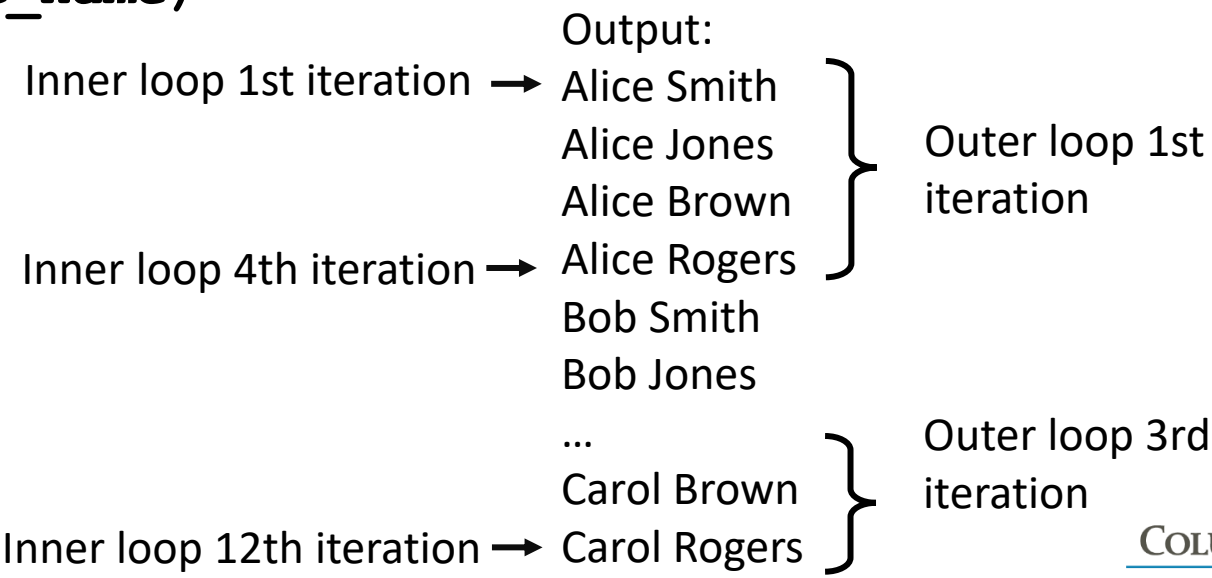
```
for number in range(5, 0, -1):
    print(number)
else:
    print('Blastoff!')
```

Output:
5
4
3
2
1
Blastoff!

Nested Loops

Loops can be “nested” such that the inner loop will iterate some number of times for each iteration of the outer loop:

```
for first_name in ['Alice', 'Bob', 'Carol']: # Outer loop
    for last_name in ['Smith', 'Jones', 'Brown', 'Rogers']: # Inner loop
        print(first_name, last_name)
```



Example: Elevator

- Input starting floor S
- Input number of floors to move N
- Start at S^{th} floor (0 means basement)
- Open doors at every N^{th} floor after that
- The 20^{th} floor is the highest
- Never stop at 13^{th} floor
- Always retire at 7^{th} floor

Glossary: Keywords & Function

Keywords

`for`

denotes the start of a "for" loop that will execute by iterating over each element in some object

Example: **`for element in my_list:`**

`while`

denotes the start of a "while" loop that will execute until a condition is met

Example: **`while some_condition:`**

`else`

default condition of a condition tree; can be used in conjunction with **`while`** to run some code after the loop has been exhausted (see example from an earlier slide)

Function

`range(start, stop, step)`

returns a sequence of numbers between **`start`** and **`stop`**

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Practice Coding:
Class Activity