ICT Learning Centre @ UL - Python and ML Foundations

Python - Loops

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Loops

Don’t **R**epeat **Y**ourself (**D.R.Y**)

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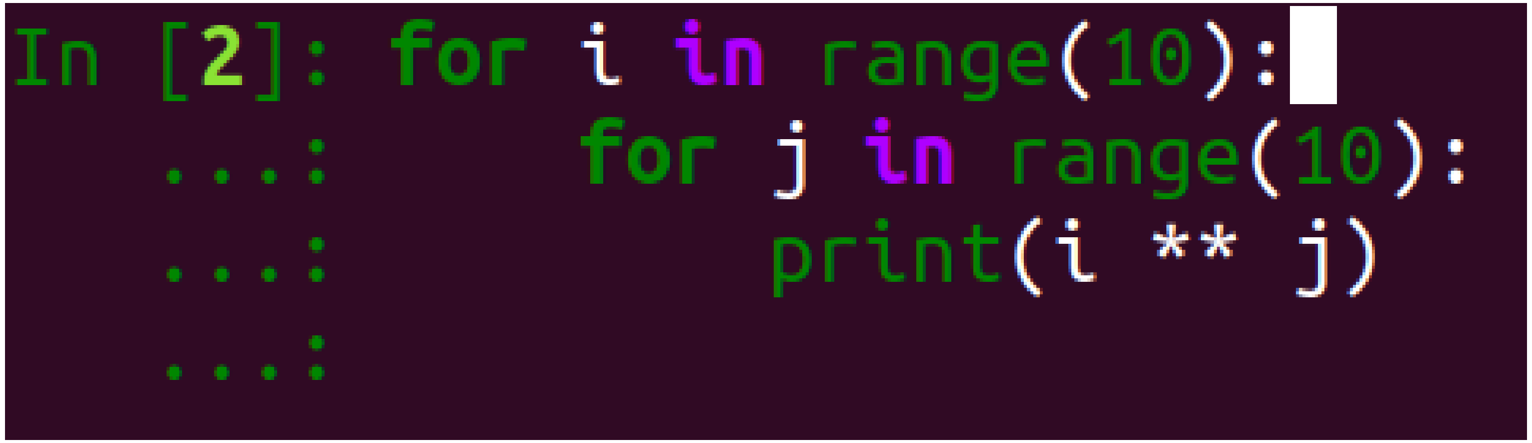
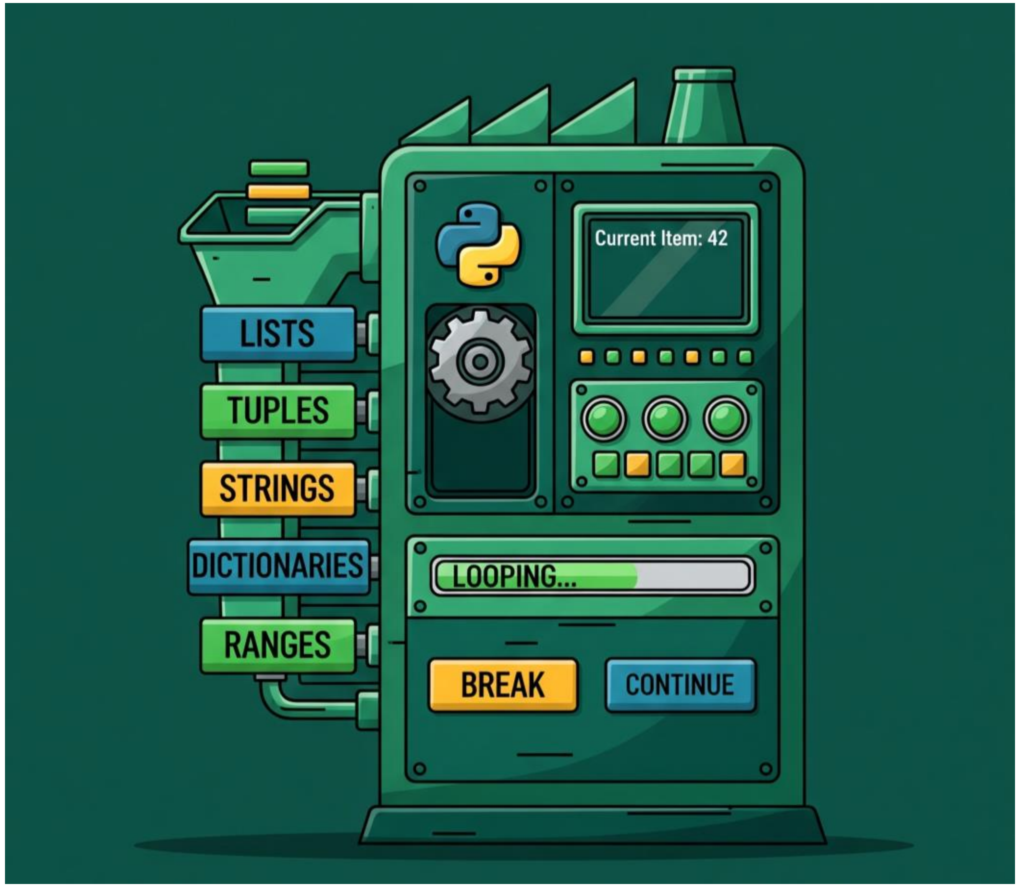


```
In [2]: for i in range(10):
   ...:     for j in range(10):
   ...:         print(i ** j)
   ...:
```

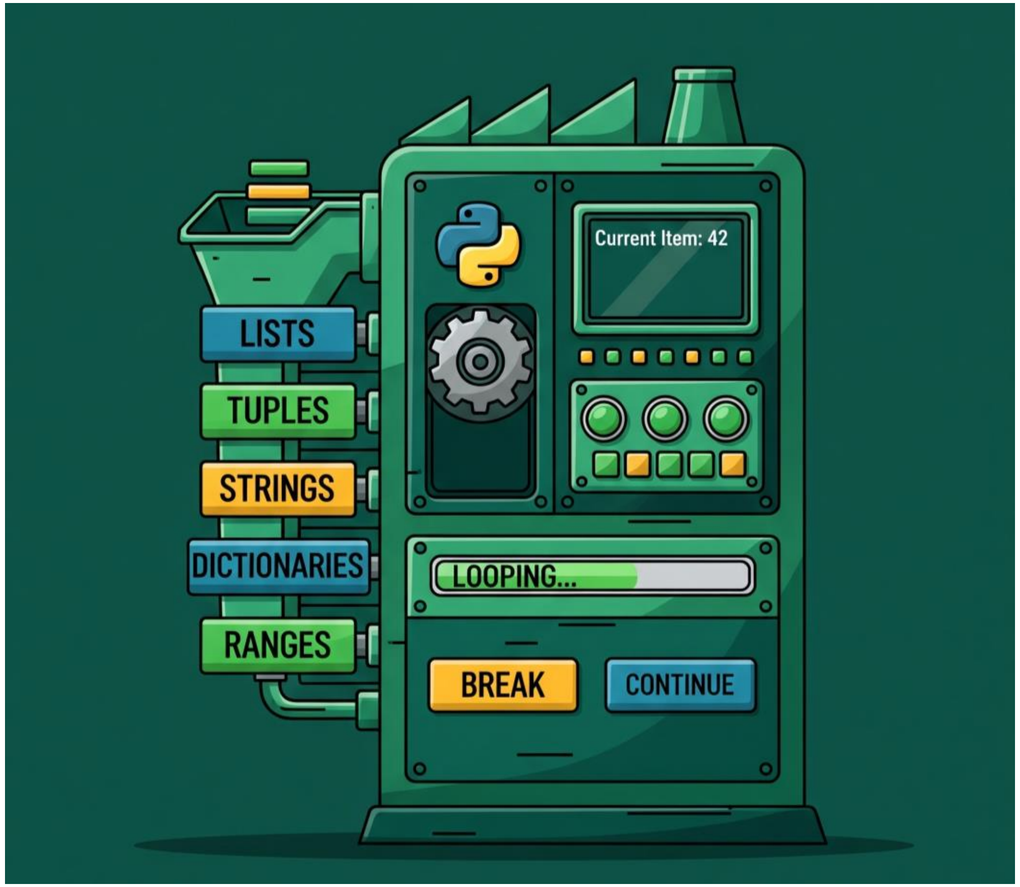
What are loops?

- Executes blocks of code for a defined number of iterations.

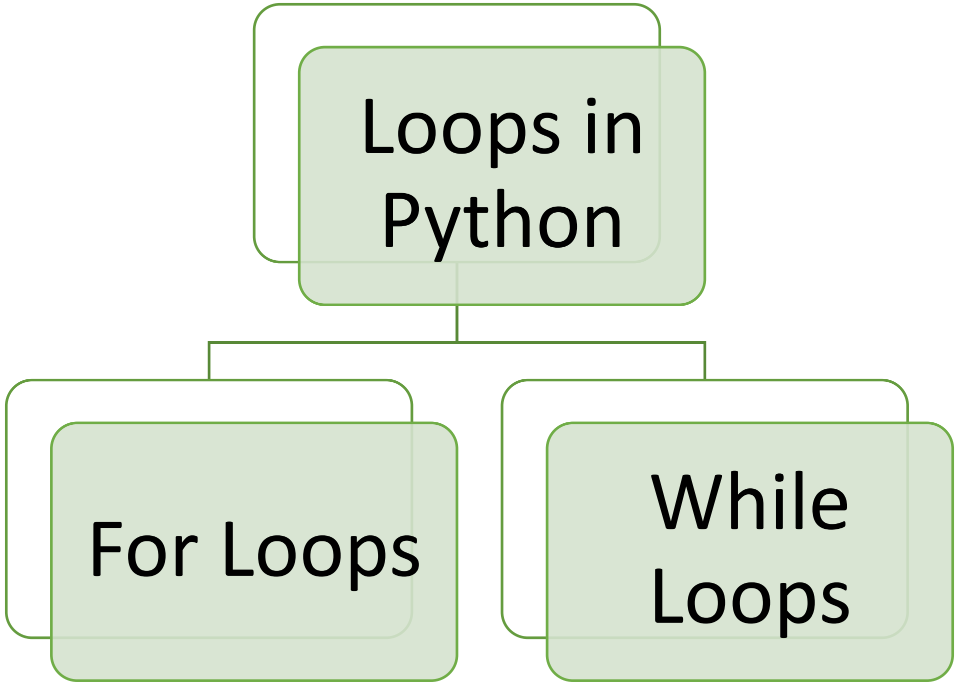


Why use loops?

- Reduces duplicate code and logic.
- Helps readability.



How to implement loops in Python?



Loops in Python

For Loops

While Loops

For loops in Python: Syntax

```
for <VARIABLE> in <ITERABLE>:
        # Do something


# End of loop
```

For loops in Python: Example

```
fruits = ["apple", "banana", "cherry"]
for fruit in fruits:
    print(fruit)
```

For loops in Python: range()

```
~~fruits = ["apple", "banana", "cherry"]~~
for i in range(5):
    print(i,“ x 7 = ”, i*7)
```

While loops in Python: Syntax

```
count = 0 # Value depends on logic
while <END_CONDITION>:
        # Do something
        count += 1 # Important! Will result in infinite loop otherwise.
# End of loop
```

While loops in Python: Example

```
fruits = ["apple", "banana", "cherry"]
count = 0
while count < len(fruits):
        print(fruit)
```

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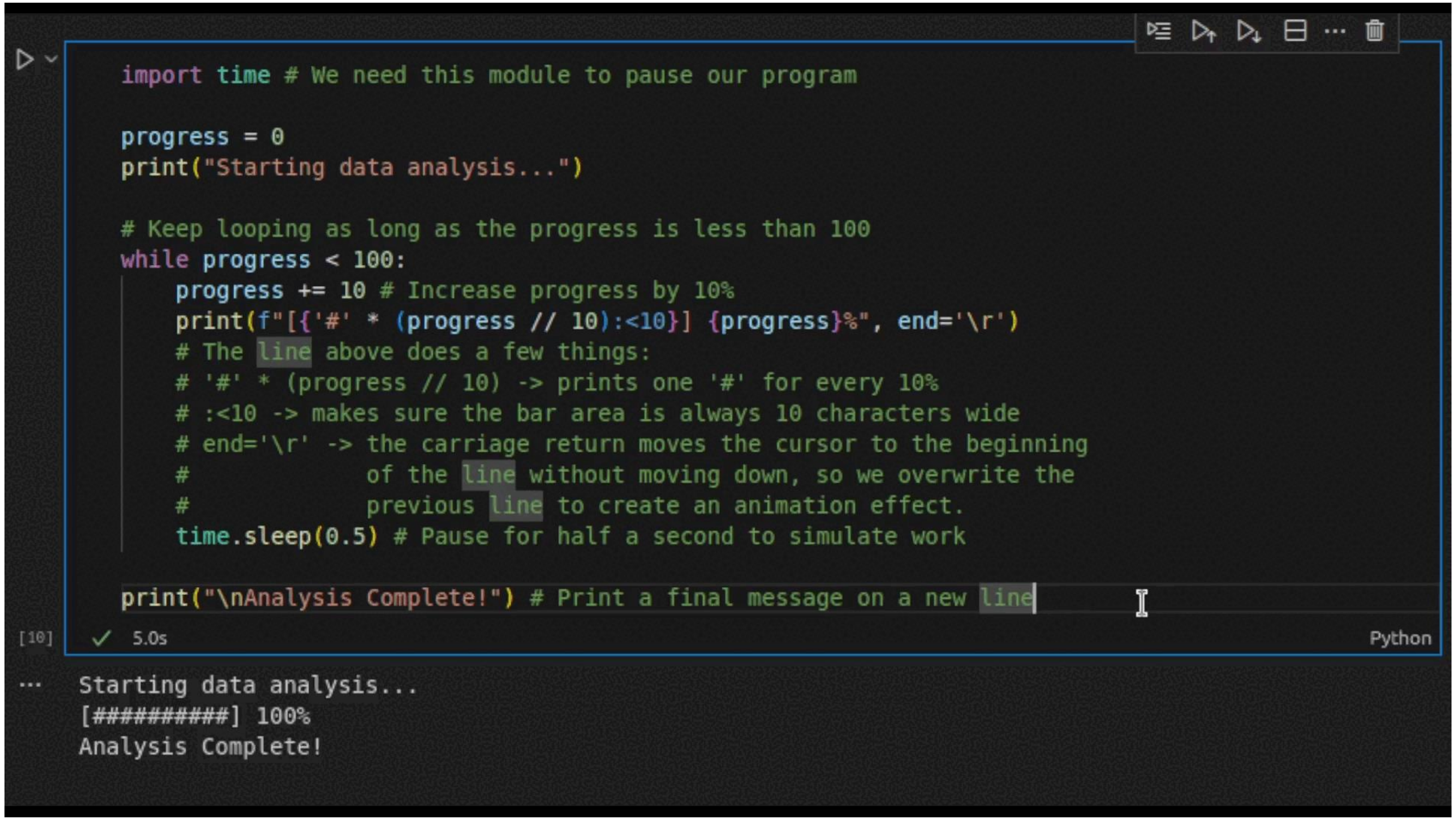
When to use while over for?



```python
import time # We need this module to pause our program

progress = 0
print("Starting data analysis...")

# Keep looping as long as the progress is less than 100
while progress < 100:
    progress += 10 # Increase progress by 10%
    print(f"[{'#' * (progress // 10):<10}] {progress}%", end='\r')
    # The line above does a few things:
    # '#' * (progress // 10) -> prints one '#' for every 10%
    # :<10 -> makes sure the bar area is always 10 characters wide
    # end='\r' -> the carriage return moves the cursor to the beginning
    #             of the line without moving down, so we overwrite the
    #             previous line to create an animation effect.
    time.sleep(0.5) # Pause for half a second to simulate work

print("\nAnalysis Complete!") # Print a final message on a new line
```

```
Starting data analysis...
[##########] 100%
Analysis Complete!
```

Flow control in loops

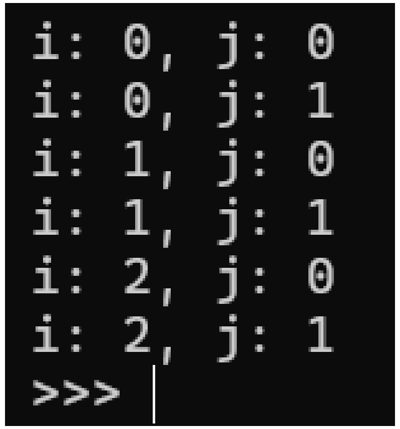
- break
  - Exits the loop during execution.
- continue
  - Skips code below and goes to next iteration.
- else
  - Code block that runs if a loop finishes normally i.e., no break.

Nested loops: What?

Nested loops in Python: Example

```
# Outer loop
for i in range(3):
        # Inner loop
        for j in range(2):
                print(f"i: {i}, j: {j}")
```

Output:



```
i: 0, j: 0
i: 0, j: 1
i: 1, j: 0
i: 1, j: 1
i: 2, j: 0
i: 2, j: 1
>>> 
```

Thank you

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