Introduction to Python Programming

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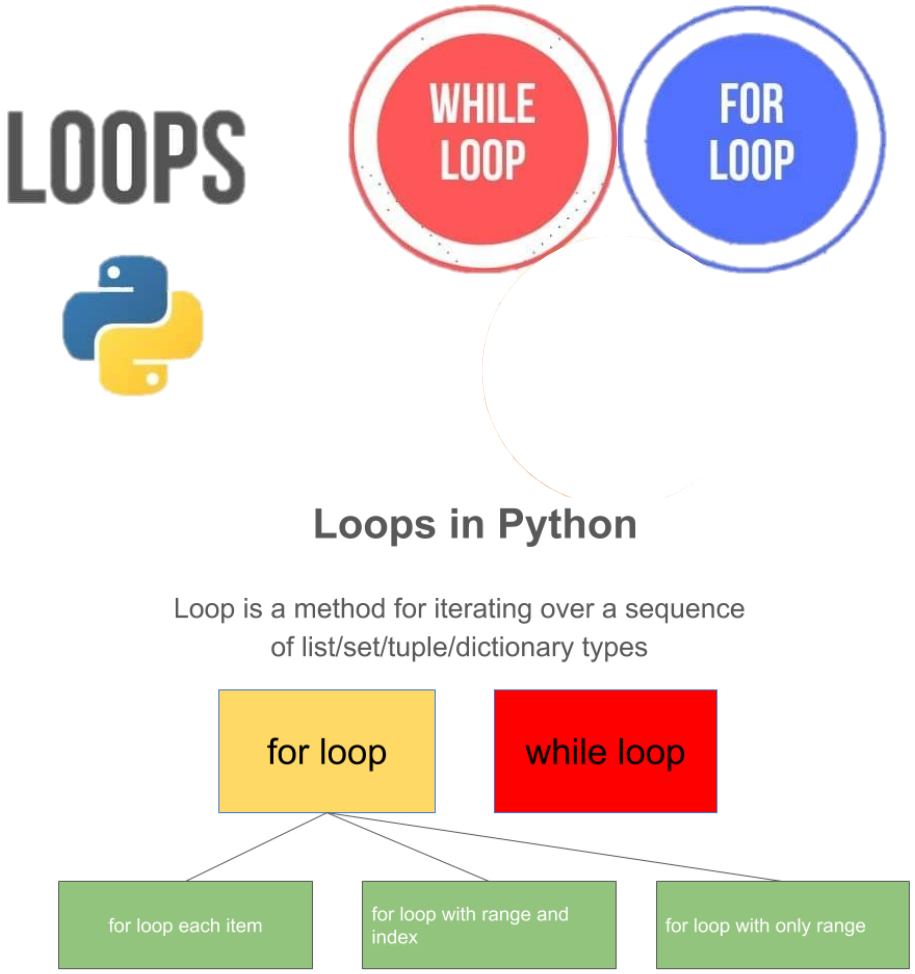
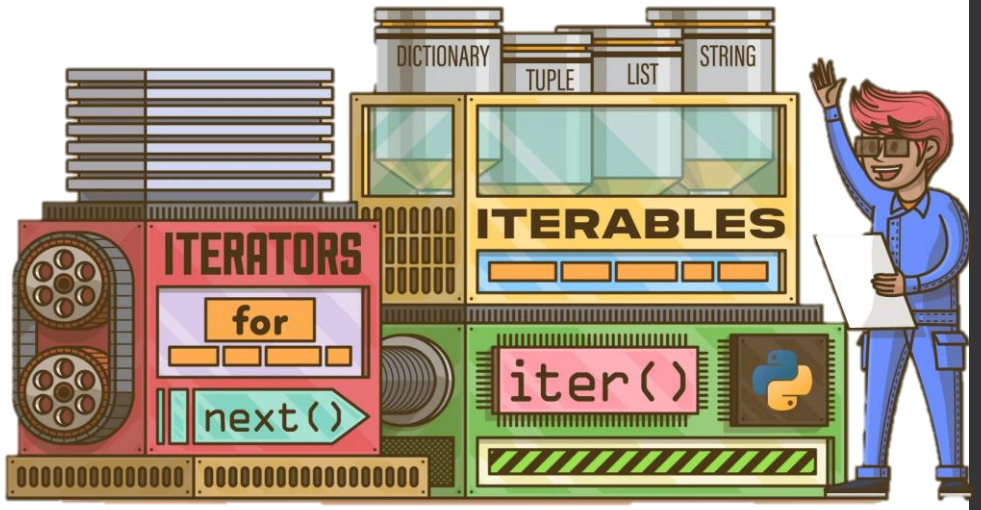
Introduction to Loops in Python

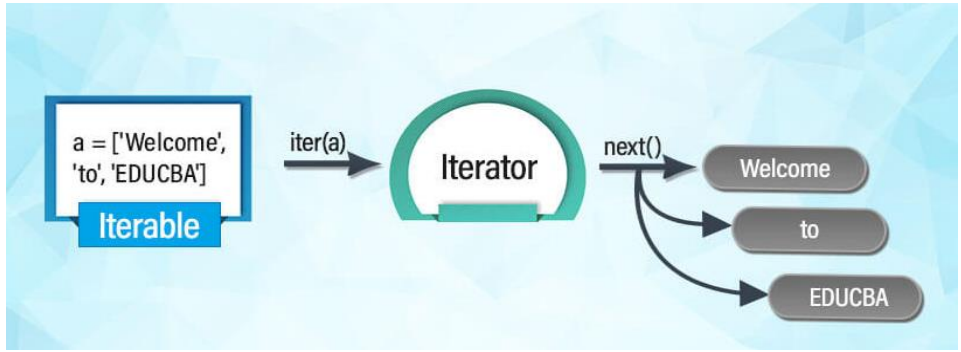
- **What are Loops?**
- Loops are programming structures that repeat a sequence of instructions until a specific condition is met. In Python, loops allow us to iterate over data structures or perform repetitive tasks efficiently.
- **Why Use Loops?**
- Loops help reduce redundancy, automate repetitive tasks, and make the code more efficient and readable.
- **Types of Loops:**
- **while Loop**: Repeats as long as a condition is true.
- **for Loop**: Iterates over items of a sequence like lists, tuples, or strings.

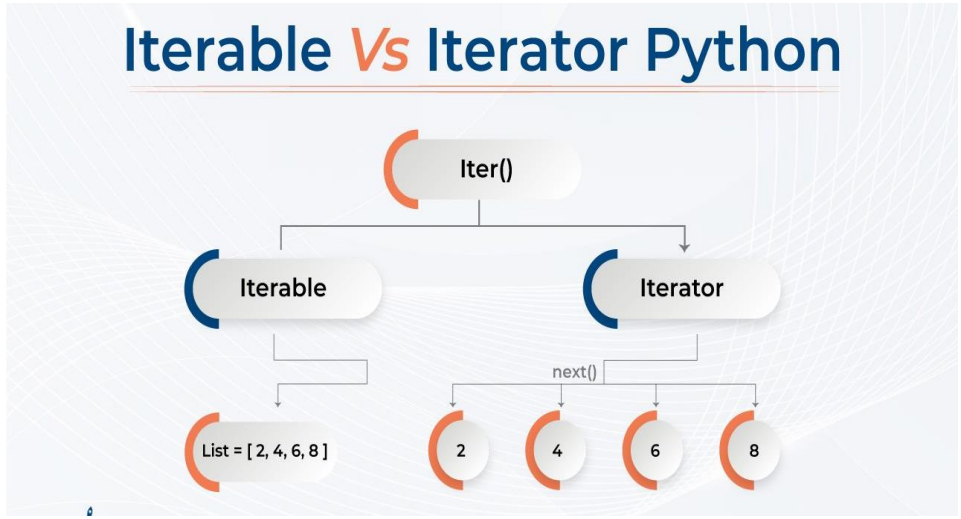


Iterating with Python Loops

- **What Does Iterating Mean?**
- Iterating refers to the process of accessing each item in a collection (like a list or a tuple) one by one. It is a fundamental aspect of loops in Python.
- **How Loops Perform Iteration:**
- Loops can be used to iterate over various Python data structures such as lists, dictionaries, sets, and even strings.
- **Key Points to Remember:**
- Loops allow sequential access to items in an iterable.
- Use loops to access or modify elements in lists, strings, and other sequences.

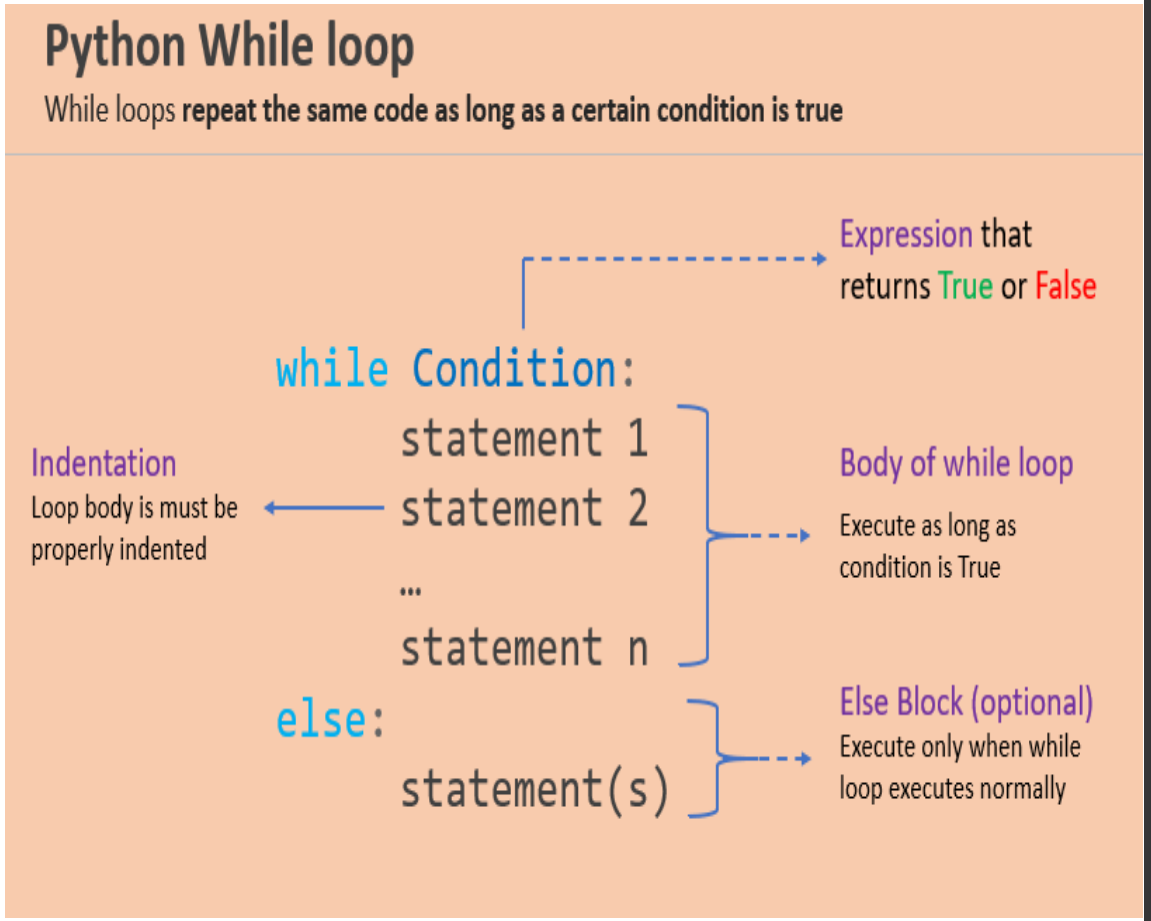






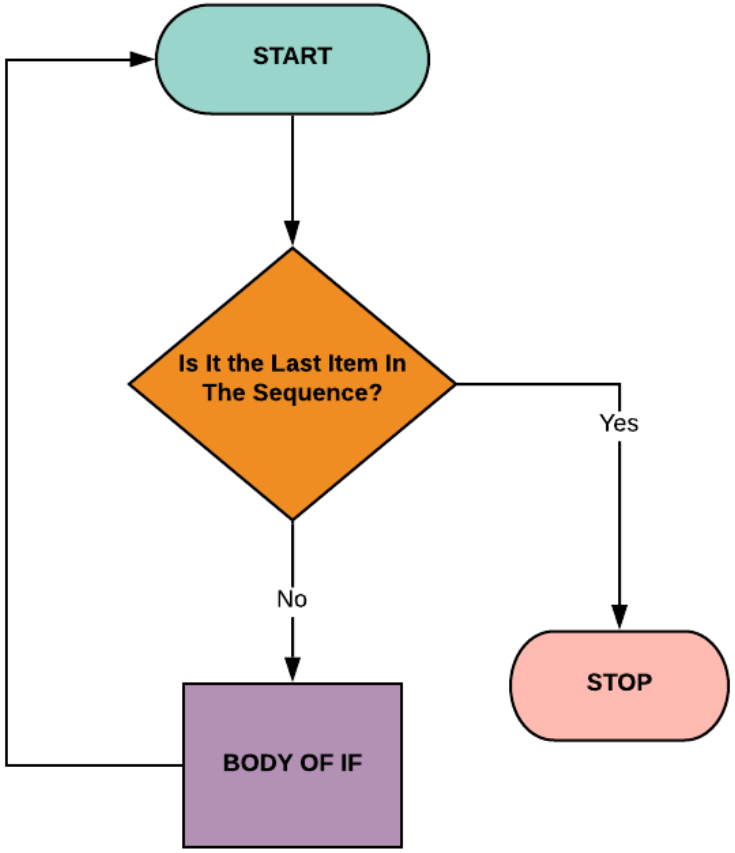
The while Loop

- **How while Loops Work:**
- The while loop runs as long as the condition is true. If the condition becomes false, the loop stops.
- **Useful Scenarios:**
- When you don't know the number of iterations beforehand (e.g., reading data from a file until it ends).
- **Example with Explanation:**
- count = 0
- while count < 3:
  - print("Counting:", count)
- count += 1
- The loop checks if count is less than 3. If true, it prints the value and increases count by 1.



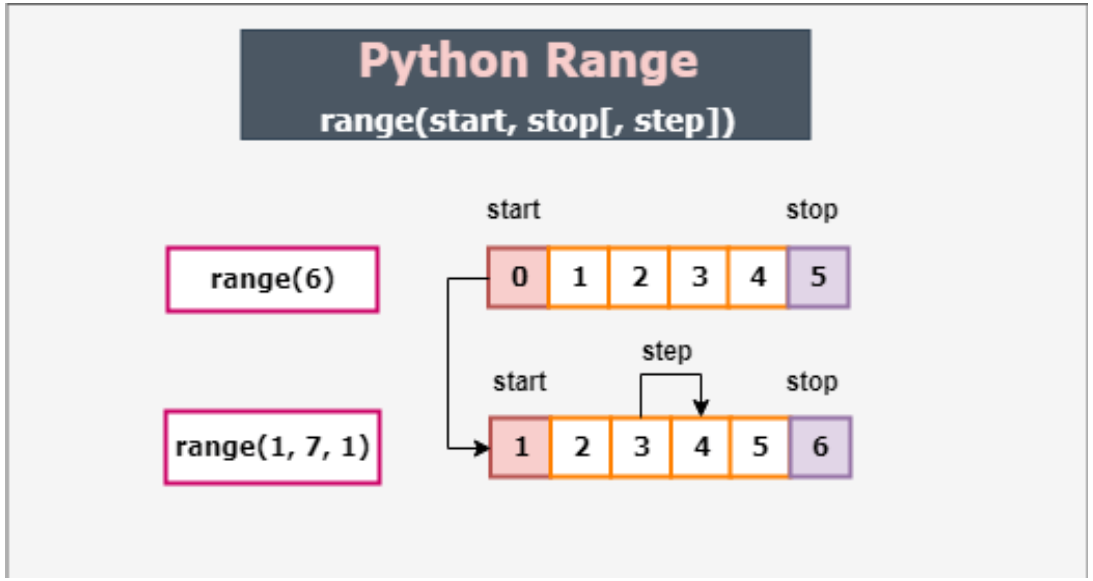
The for Loop

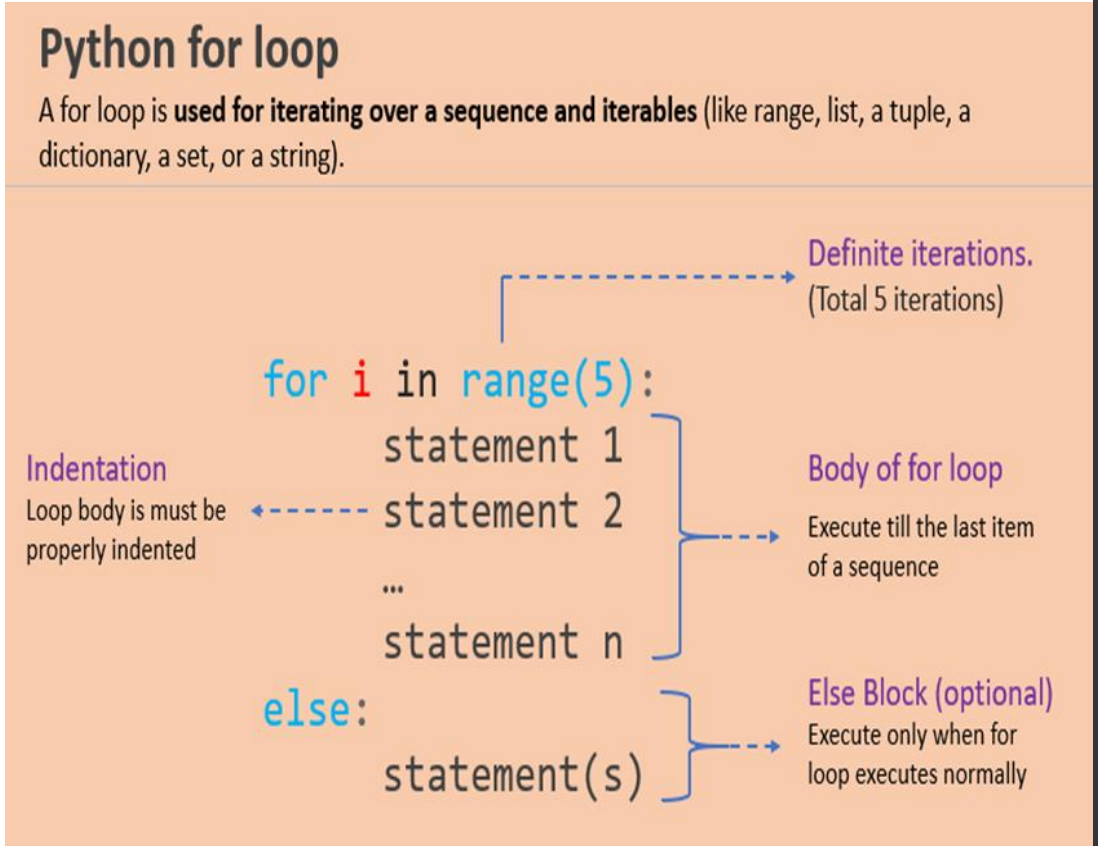
- **How for Loops Work:**
- The for loop iterates over each item of an iterable (like a list or string) until all items are processed.
- **When to Use for Loops:**
- When you know the number of iterations or need to iterate over each item in a collection.
- **Example with Explanation:**
- colors = ["red", "green", "blue"]
- for color in colors:
- print("Color:", color)
- **Using for Loops with Dictionaries:**
- data = {"name": "John", "age": 25}
- for key, value in data.items():
- print(f"{key}: {value}")



The range() Function

- **Purpose of range():**
- range() generates a sequence of numbers, making it useful for looping a specific number of times.
- **Parameters of range():**
- **start:** Starting number (default is 0).
- **stop:** End number (non-inclusive).
- **step:** Increment (default is 1).
- Example with range():
- for i in range(1, 6):
- print(i)
- This prints numbers from 1 to 5. The loop ends before reaching 6.
- Additional Use Case –Reverse Iteration:
- for i in range(5, 0, -1):
- print(i)





The break Statement

- **What Does break Do?**
- The break statement allows you to exit a loop prematurely. It's commonly used to stop loops based on a condition.
- **When to Use break:**
- When a specific condition is met, and you need to stop the loop immediately (e.g., finding an element in a list).
- **Example with break:**
- for number in range(10):
- if number == 5:
- break
- print(number)
- This prints numbers from 0 to 4. The loop stops when it reaches 5.

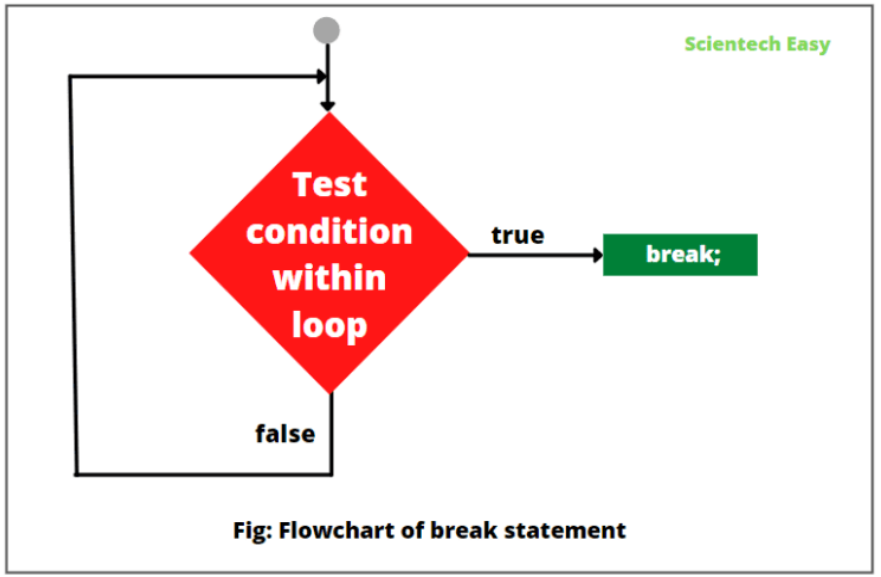


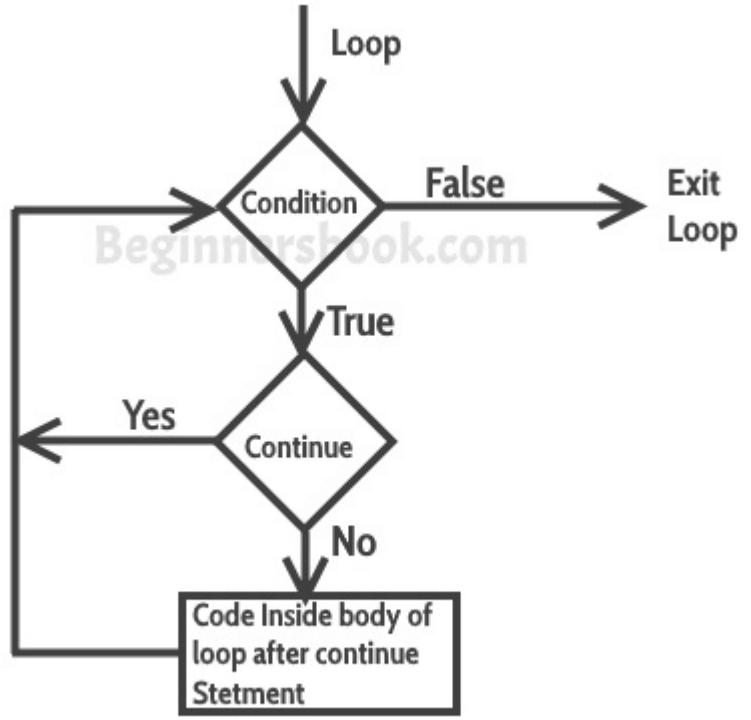
Fig: Flowchart of break statement

```
for val in sequence:
  # code
  if condition:
    break

  # code
```

```
while condition:
  # code
  if condition:
    break

  # code
```

The continue statement

- **What Does continue Do?**
- The continue statement skips the current iteration and moves to the next one. It doesn't terminate the loop but simply skips the remaining code for that iteration.
- **When to Use continue:**
- To skip unwanted iterations (e.g., skipping certain values in a dataset).
- Example with continue
- for i in range(5):
  - if i == 2:
  - continue
- print(i)
- The loop prints all numbers except 2. When i == 2, the loop skips that iteration.




```
students = ['Ashton', 'Jack', 'Rose', 'Tim', 'Elle', 'Johnny', 'Sammy',
    'David', 'Monica', 'Arjun']

for n in students:
    if len(n) == 4:
        continue
    print('Hello', n)
```

The pass statement

- The pass Statement
- What is pass Used For?
- The pass statement is a null operation; nothing happens when it is executed. It’s used as a placeholder for code you’ll add later.
- **When to Use pass**:
- In places where code is required syntactically, but you don’t want to execute anything yet (e.g., in a try block without an exception handler yet).
- **Example with pass:**
- for i in range(5):
  - if i < 3:
  - pass
- print(i)
- This prints all numbers from 0 to 4, but pass does nothing when i is less than 3.

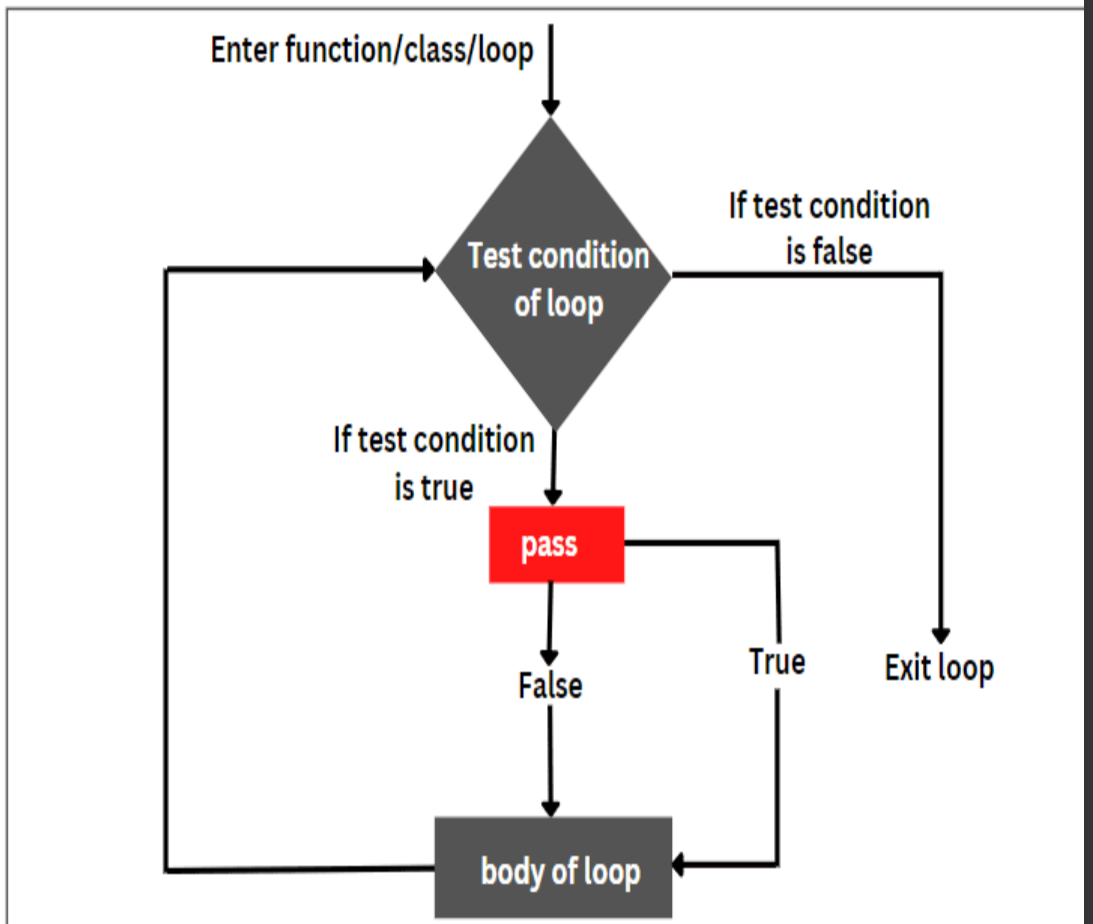


Fig: Flowchart diagram of Pass statement in Python

python_code.py > ...

```
1  i = 1
2
3  if(i <= 10):
4      pass
5
6  print("outside if statement")
```