Python - Loop

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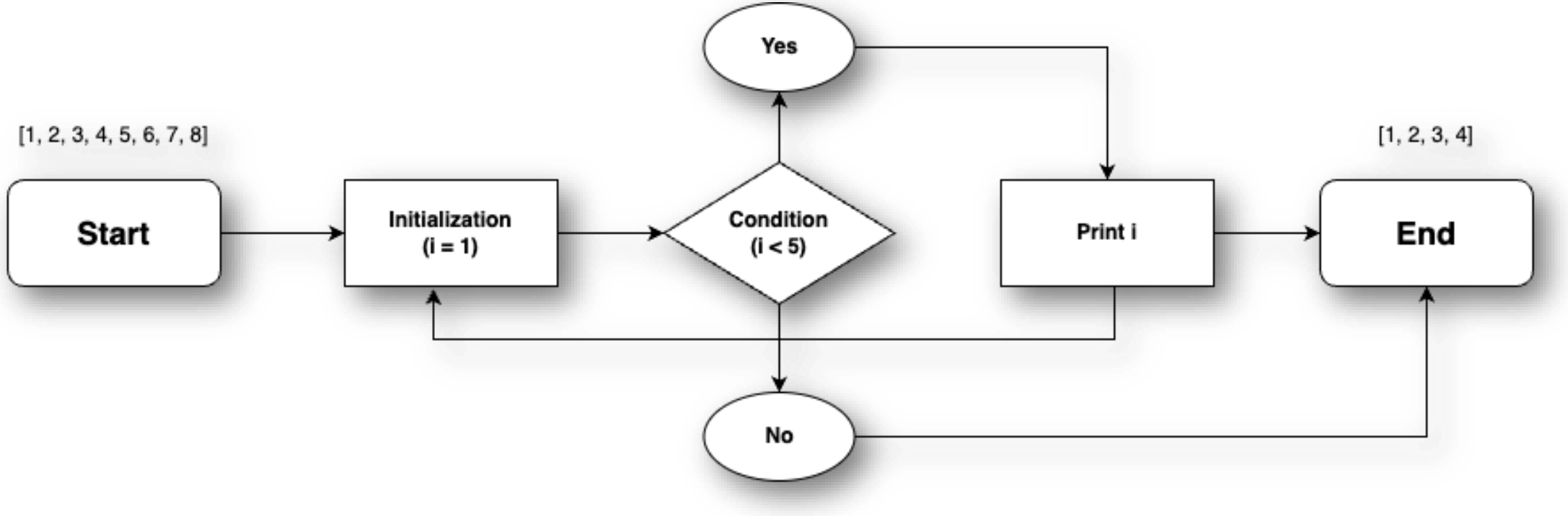
Loop

Definition:

A **loop** in programming is a construct that allows us to repeat a block of code as long as a certain condition is met.

Example:



For-loop

Definition:

A **for-loop** is used to iterate over a sequence (e.g., list, string, tuple, or other iterable objects). It executes a block of code once for each item in the sequence.

Syntax:

```
for item in sequence:
    # Code block to execute
```

Elements:

- **for**: Keyword to start the loop.
- **item**: A variable that takes the value of each element in the sequence one at a time.
- **in**: Keyword to specify the sequence to iterate over.
- **sequence**: The iterable object (e.g., list, string, tuple, etc.).
- **Code Block**: The indented code inside the loop executed for each item.

For-loop example

Example:

```python
# List of fruits
fruits = ["apple", "banana", "cherry"]

# Using for-loop to print each fruit
for fruit in fruits:
    print(fruit)
```

Output:

```
apple
banana
cherry
```

Explanation:

- The variable fruit takes the value of each element in the list fruits.
- The loop executes three times, once for each element in the list.

Range()

Definition:

The **range()** function generates a sequence of numbers, commonly used in loops for counting or iterating over a range of numbers.

Syntax:

```
range(start, stop, step)
```

Elements:

- **start**: The beginning of the sequence (default is 0).
- **stop**: The endpoint (excluded from the sequence).
- **step**: The increment/decrement between numbers (default is 1).

Range() in For-loop

Example:

```
# Print numbers from 1 to 5
for num in range(1, 6):
    print(num)
```

Output:

```
1
2
3
4
5
```

Enumerate()

Definition:

The enumerate() function adds a counter to an iterable and returns it as an enumerate object. It's often used **when both the index and value of elements in a sequence are needed**.

Syntax:

```
enumerate(iterable, start=0)
```

Elements:

- **iterable**: The sequence to iterate over.
- **start**: The starting value of the counter (default is 0).

Enumerate() in For-loop

Example:

```python
# List of names
names = ["Alice", "Bob", "Charlie"]

# Using enumerate to get index and value
for index, name in enumerate(names):
    print(f"Index: {index}, Name: {name}")
```

Output:

```
Index: 0, Name: Alice
Index: 1, Name: Bob
Index: 2, Name: Charlie
```

While-loop

Definition:

A while-loop executes a block of code **repeatedly as long as a given condition is True**. It is used when the number of iterations is not known beforehand and depends on a condition.

Syntax:

```
while condition:
    # Code block to execute
```

Elements:

- **while**: Keyword to start the loop.
- **condition**: A boolean expression that controls the loop execution.
- **Code Block**: The indented block of code that runs repeatedly until the condition becomes False.

While-loop example

Example:

```python
# Initialize an empty list
numbers = []

# Initialize a counter
i = 1

# Append numbers 1 to 5 to the list
while i <= 5:
    numbers.append(i)
    i += 1

print(numbers)
```

Output:

```
[1, 2, 3, 4, 5]
```

Explanation:

- **Initialization**: numbers starts as an empty list and i is set to 1.
- **Condition**: The loop runs as long as i <= 5.
- **Code Block**: i is appended to the numbers list incremented by 1.
- **Termination**: The loop stops when i becomes 6.

Thank You!

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