Day02 Presentation Slides

Contents

String Intro

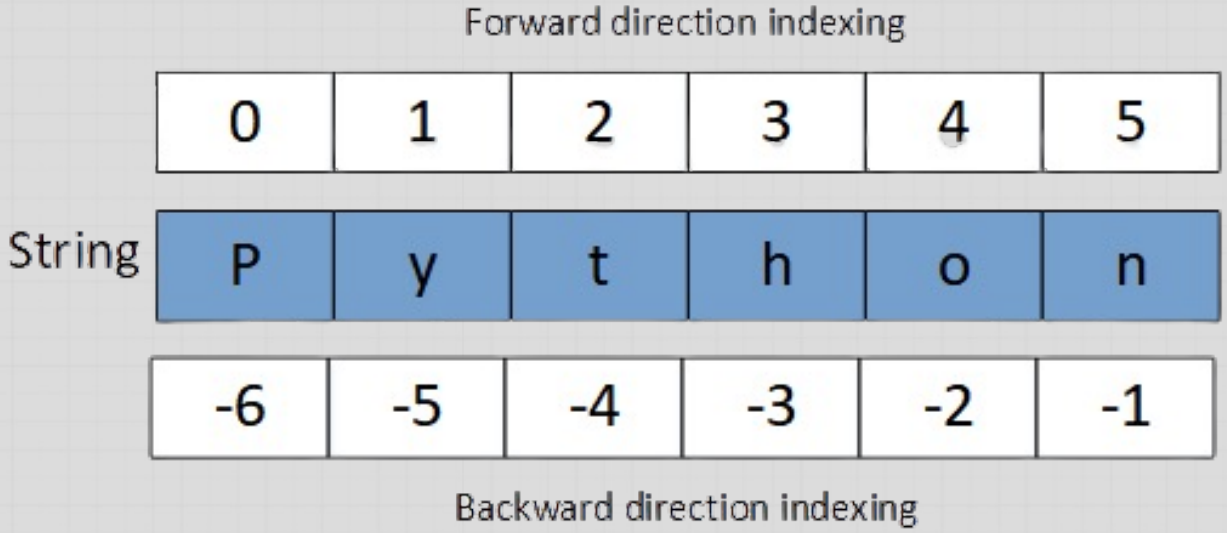
- A string is an object that represents sequences of characters
- A string object is immutable, Once it is created it can't be altered
- String objects are surrounded by either single quotes or double quotes

```
name = 'Wooden Spoon'
language = "Python"
```

```
sentence1 = 'This is a string'
sentence2 = "This is also a string"
```

String: Sequences of characters

- Strings are ordered sequences of characters, and each character has two index numbers:
  - Forward Index: starts from 0 (first character) and increases by 1 for each next character to the right
  - Reverse Index: starts from -1 (last character) and decreases by 1 for each next character to the left



String: Indexing

- Indexing allows us to access individual characters of string by using brackets [ ]

```
name = 'Python'

# forward indexes:  0, 1, 2, 3, 4, 5
# backward indexes: -1, -2, -3, -4, -5, -6

print(name[0])   # prints 'p'
print(name[1])   # prints 'y'

print(name[-1])  # prints 'n'
print(name[-2])  # prints 'o'

print(name[10])  # string index out of range
print(name[-10]) # string index out of range
```

Slicing Strings: Start & End Indexes

- Creates a range of characters (substring) by using the slice syntax [start : end]
- We can specify the start index and end index (excluded), separated by a colon,

  to create the substring

```
word = 'Wooden Spoon'

s1 = word[0:6]

print(s1) # prints 'Wooden'

s2 = word[2:6]
print(s2) # prints 'oden'
```

Slices “Wooden Spoon” starting from index 0 to index 6 (index 6 is excluded)

Slices “Wooden Spoon” starting from index 2 to index 6 (index 6 is excluded)

Slicing Strings: Slice From the Start

- By not giving the start index, the slicing starts from first character [: end]

```
word = 'Wooden Spoon'

s1 = word[:7]
print(s1) # prints 'Wooden'


word = "Hello Cydeo"

s1 = word[:5]
print(s1) # prints 'Hello'
```

Slices “Wooden Spoon” starting from index 0 to index 7 (index 7 is excluded)

Slices “Hello Cydeo” starting from index 0 to index 5 (index 5 is excluded)

Slicing Strings: Slice to the End

- By not giving the end index, the slicing starts from the start index to the end of the string [start :]

```
word = 'Wooden Spoon'

s1 = word[7:]
print(s1) # prints 'Spoon'


word = "Hello Cydeo"

s2 = word[6:]
print(s2) # prints 'Cydeo'
```

Slices “Wooden Spoon” starting from index 7 to the end

Slices “Hello Cydeo” starting from index 6 to the end

String Methods

- Python has a built-in string class named str
- The built-in string class (str) has a set of built-in methods that we can use
- A string object is immutable, methods of string can not change the original string, therefore they return new values

String Methods

Method Name	Method Name	Method Name
lower()	upper()	capitalize()
title()	strip()	index()
rindex()	replace()	count()
swapcase()	startswith()	endswith()
islower()	isupper()	isdigit()
isalpha()	istitle()	

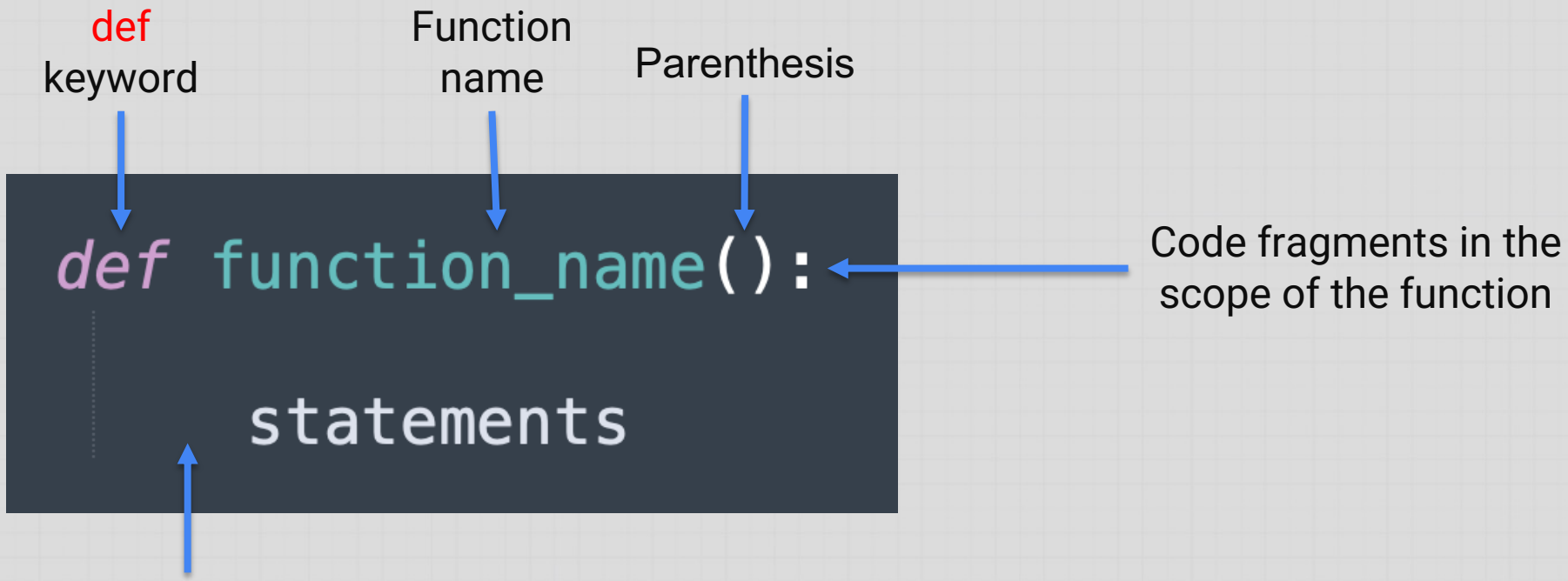
Function

- Grouping a series of code fragments to perform a task
- Allows us to reuse the function rather than repeating the same set of statements
- Improves the reusability and efficiency of our codes

```
print()
input()
cube()
display_message()
reverse()
sort()
...
```

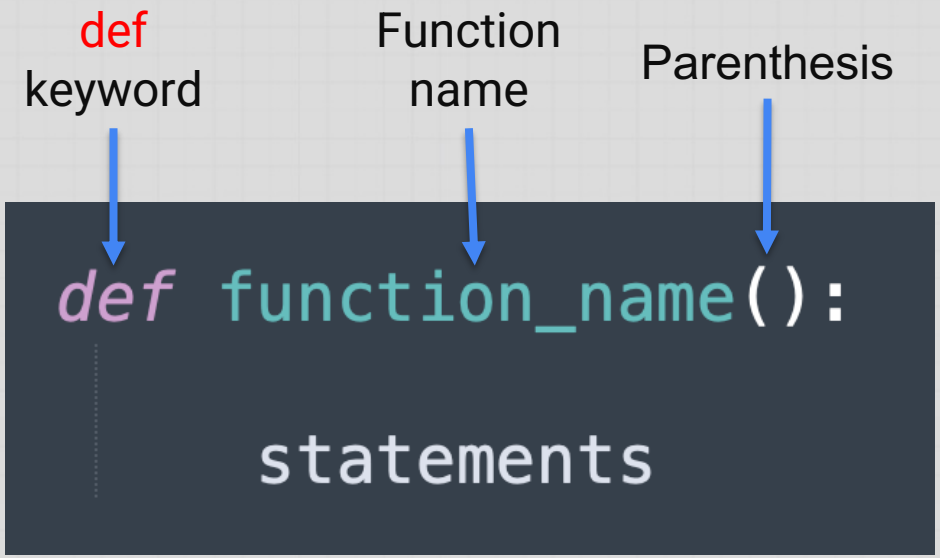
Declaring A Function

- A function must be declared before we call it and use it
- To create a function, we need to use the def keyword



Components of Function

- The def keyword: indicates that the start of the function
- The function name: Descriptive name of the function
- The parenthesis: function/method name is always followed by a set of parenthesis, can be capable of receiving arguments



Calling a Function

- When we need to script to perform the task the function does
- The function executes the codes in its scope from top to button
- When it has finished, the code continues to run from the point where it was initially called

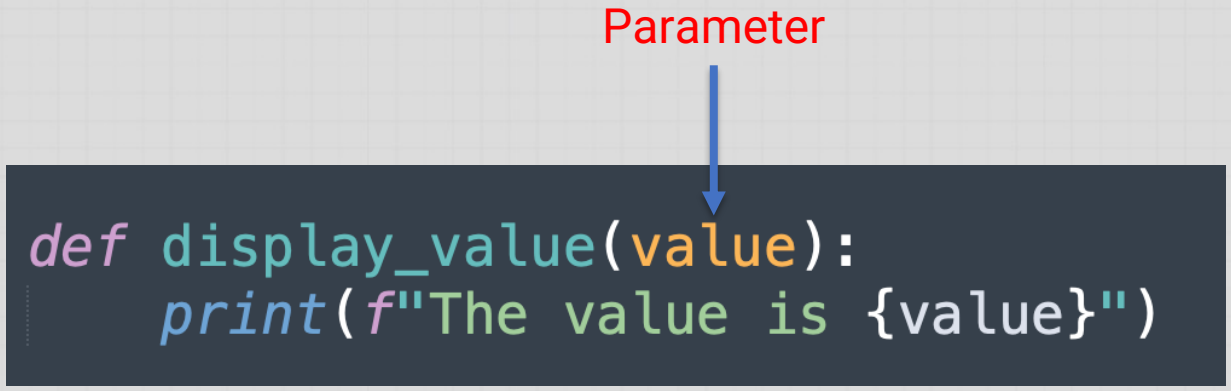
Calling a Function

```
display_message()
```

```
def display_message():
    print("Hello World!")
    print("I love Python")
```

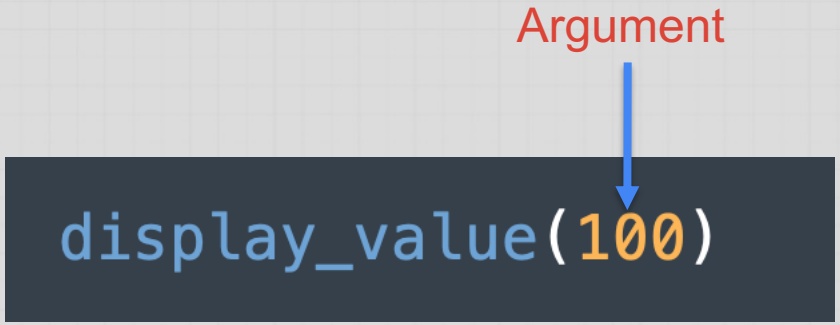
Passing Parameters to Function

- When we declare a function, parameters can be given
- Parameters passed to the function act like variables within the function's scope
- Used for providing additional information the function must have to perform its task



Calling a Function that Needs Information

- Must specify the values the method should use
- Values need to be given in the parentheses that follow the function name
- The values we passed to the method are called arguments
- Arguments can be provided as values or as variables



Calling a Function that Needs Information

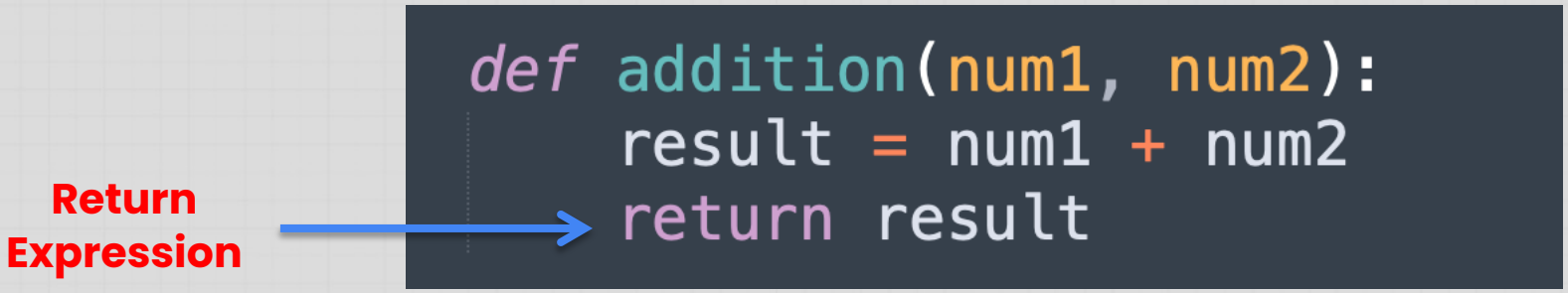
```
display_value(100)
```

Argument 100 is copied into
the parameter variable value

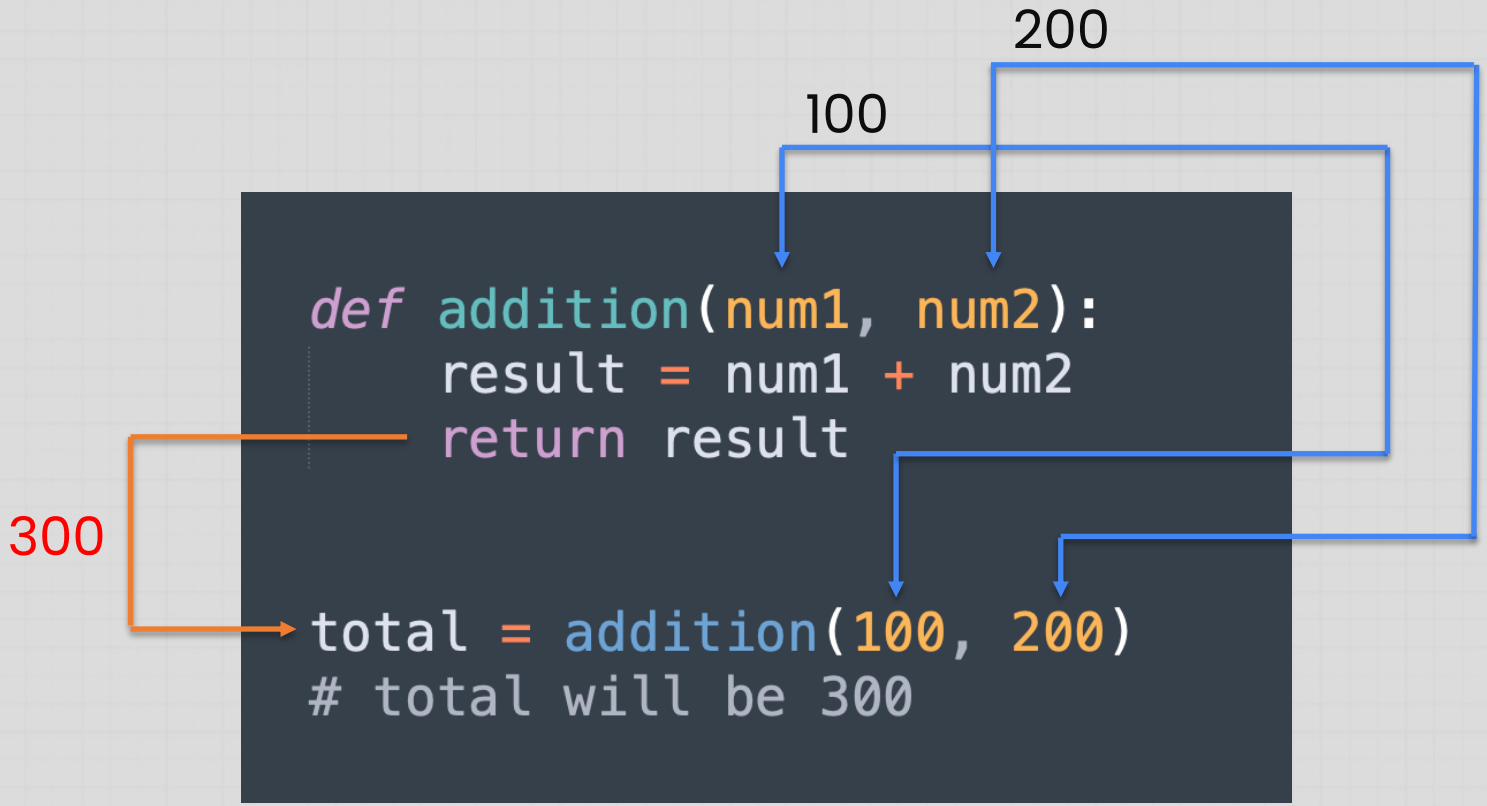
```
def display_value(value):
    print(f"The value is {value}")
```

Return Values From Functions

- A function can return a value by using a return statement
- The value that the function returned can be used outside the function's scope
- When the function is being called, it will give the value that the function returned



Calling a Value Returning Function



Import Statement

- Allows us to reuse the functions/features of one python file (.py) in another
- We need to import the python file in order to use its properties in other python files

My_Library.py

```
def square(num):
    return num * num


def cube(num):
    return square(num) * num


def print_each(sequence):
    for each in sequence:
        print(each)
```

Test.py

```
import My_Library

n1 = My_Library.square(9)

n2 = My_Library.cube(5)

list1 = {'Python', 'Cydeo', 'Wooden Spoon'}
My_Library.print_each(list1)
```

Define Alias for Import Statement

- We can create an alias name by using the as keyword when we import a python file

My_Library.py

```
def square(num):
    return num * num


def cube(num):
    return square(num) * num


def print_each(sequence):
    for each in sequence:
        print(each)
```

Test.py

```
import My_Library as lib

n1 = lib.square(9)

n2 = lib.cube(5)

list1 = {'Python', 'Cydeo', 'Wooden Spoon'}
lib.print_each(list1)
```

From Keyword

- The from keyword allows us to import only parts of python files properties

My_Library.py

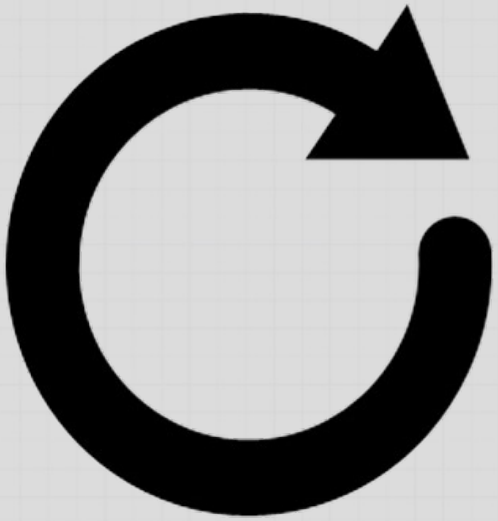
```
def square(num):
    return num * num


def cube(num):
    return square(num) * num


def print_each(sequence):
    for each in sequence:
        print(each)
```

Test.py

```
from My_Library import print_each, cube

n = cube(20)

tuple1 = {'Cherry', 'Apple', 'Lemon'}
print_each(tuple1)
```

Loops

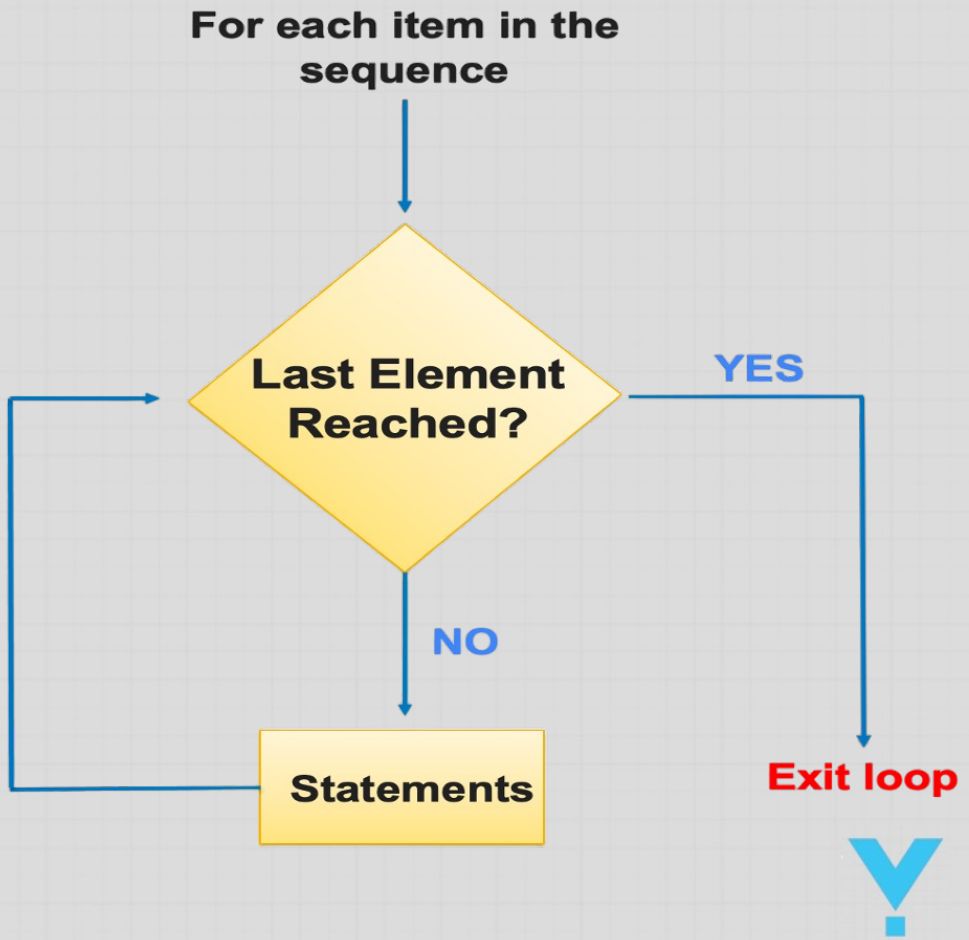
- Used for repeating a set of statements
- There are two types of loops:
  - For Loop
  - While Loop



LOOPS REPEAT ACTIONS...
SO YOU DON'T HAVE TO

For Loop

- For loop is used to access each successive value of a sequence or a data structure
- The built-in sequences and data structures are:
  - String
  - Tuple
  - List
  - Set
  - Dictionary



For Loop Syntax

A variable name (can be any name), which used for containing each element of the sequence during each execution of the loop

Reference name of a sequence

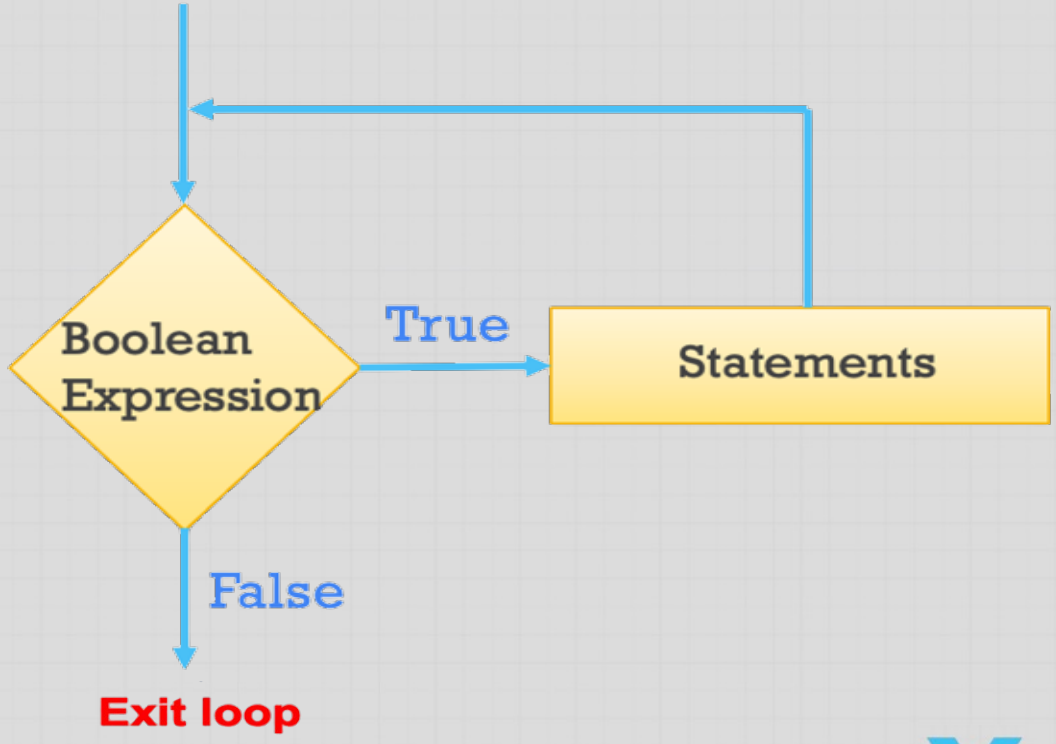
```
for varName in sequence:
    statements
```

This code fragment is within the scope of the for loop

To define the scope of the while loop, indentation (whitespaces at the beginning of the line) is needed

While Loop

- Repeated If Statement
- While Loop checks a condition
- If the condition returns true, a code block will run
- The condition will be checked again
- It repeats until the condition returns false



While Loop Syntax

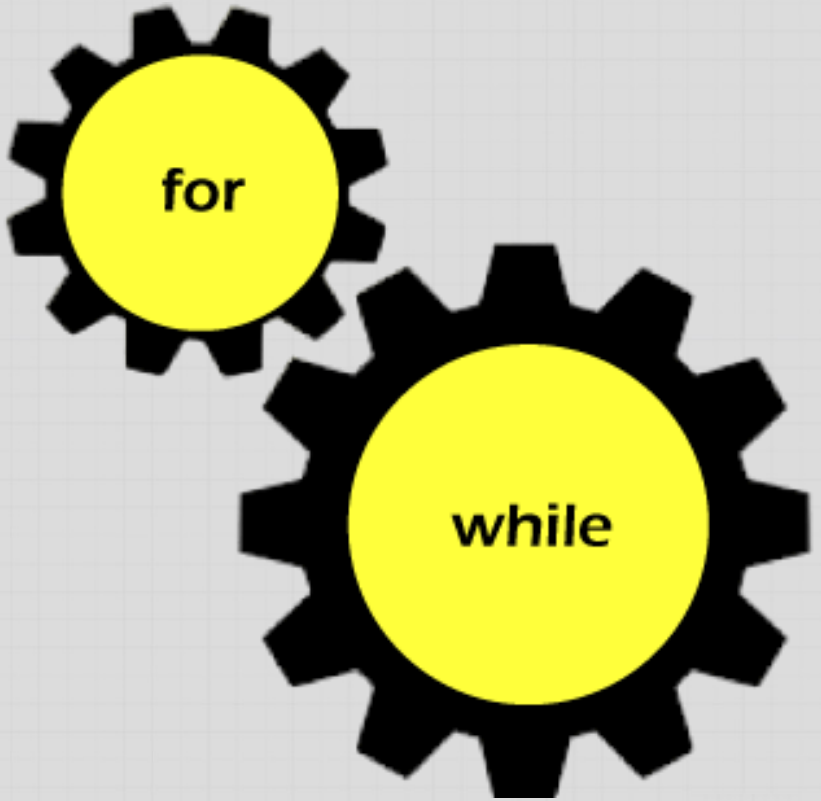
```
while Condition:
    statements
```

This code fragment is within the scope of the while loop

To define the scope of the while loop, indentation (whitespaces at the beginning of the line) is needed

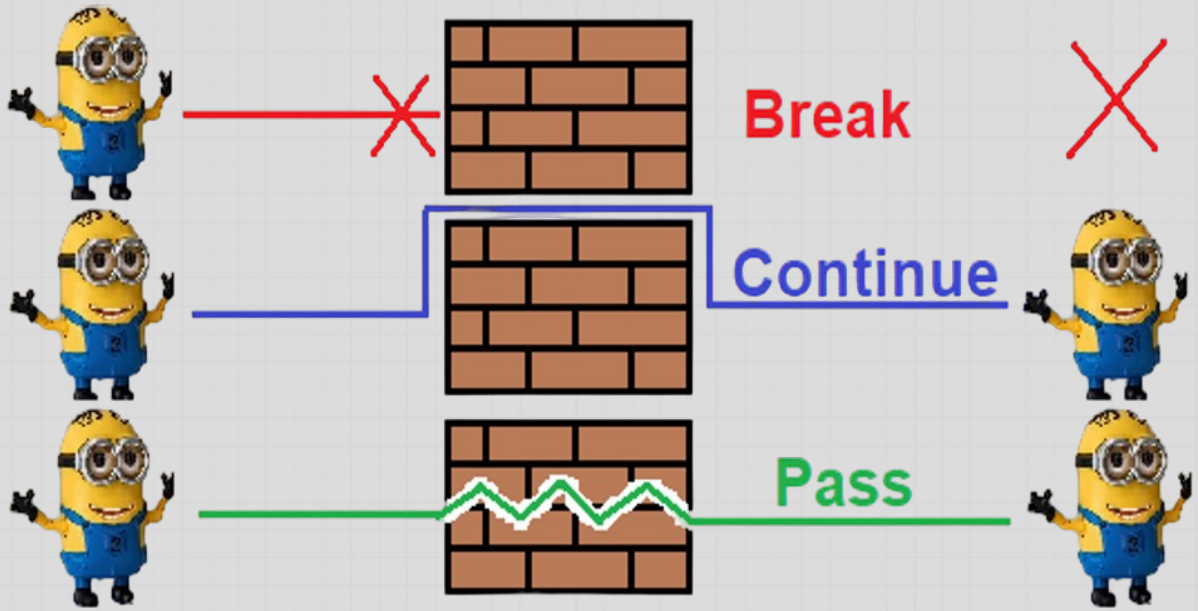
For Loop vs While Loop

- You can use a for loop, a while loop, whichever is convenient
- A for-loop maybe used if the number of repetition is known in advance
- A while loop may be used used if the number of repetition is not fixed



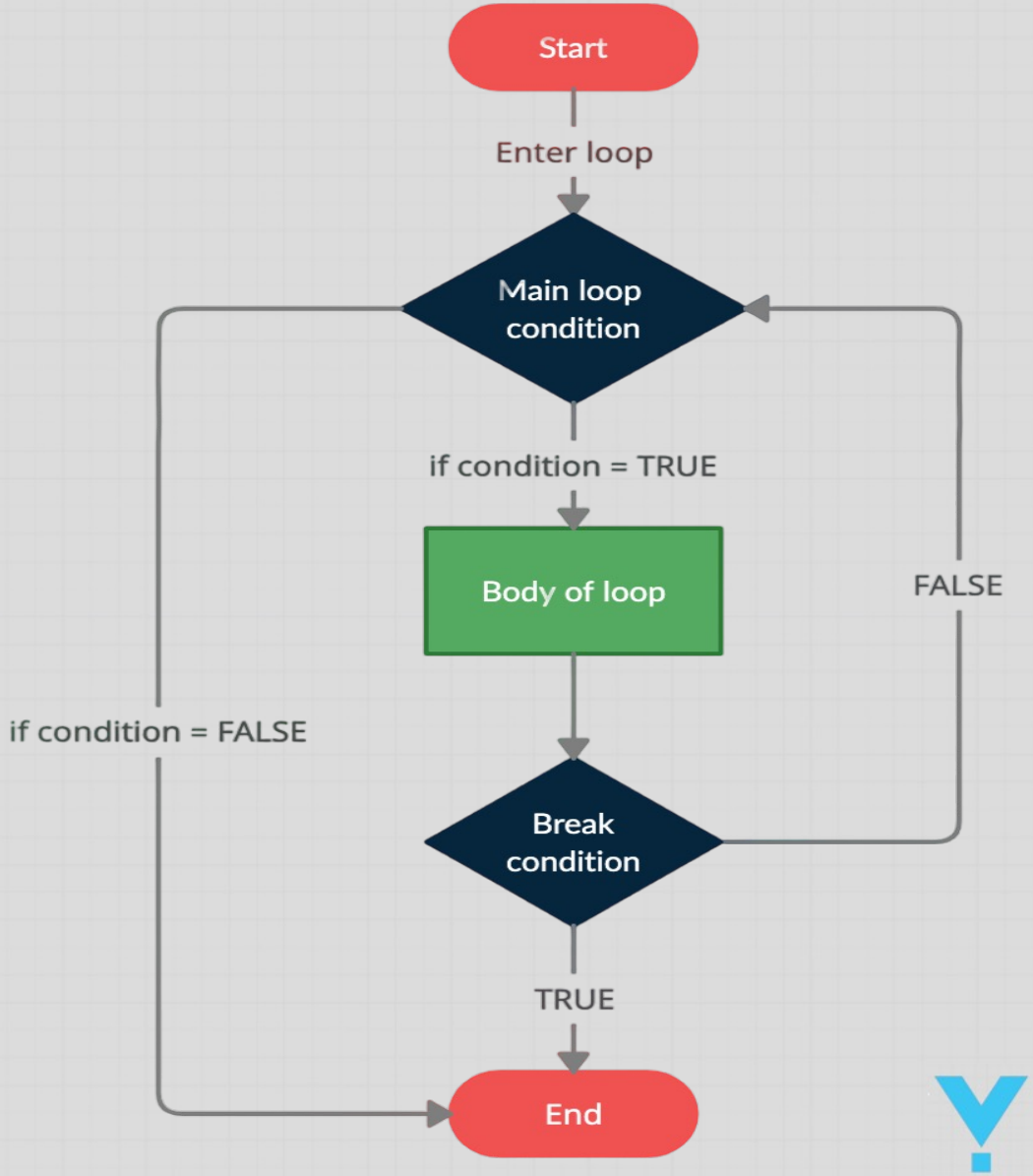
Branching Statements

- Used to change the normal flow of execution
- There are three branching statements:
  - Break
  - Continue
  - Pass



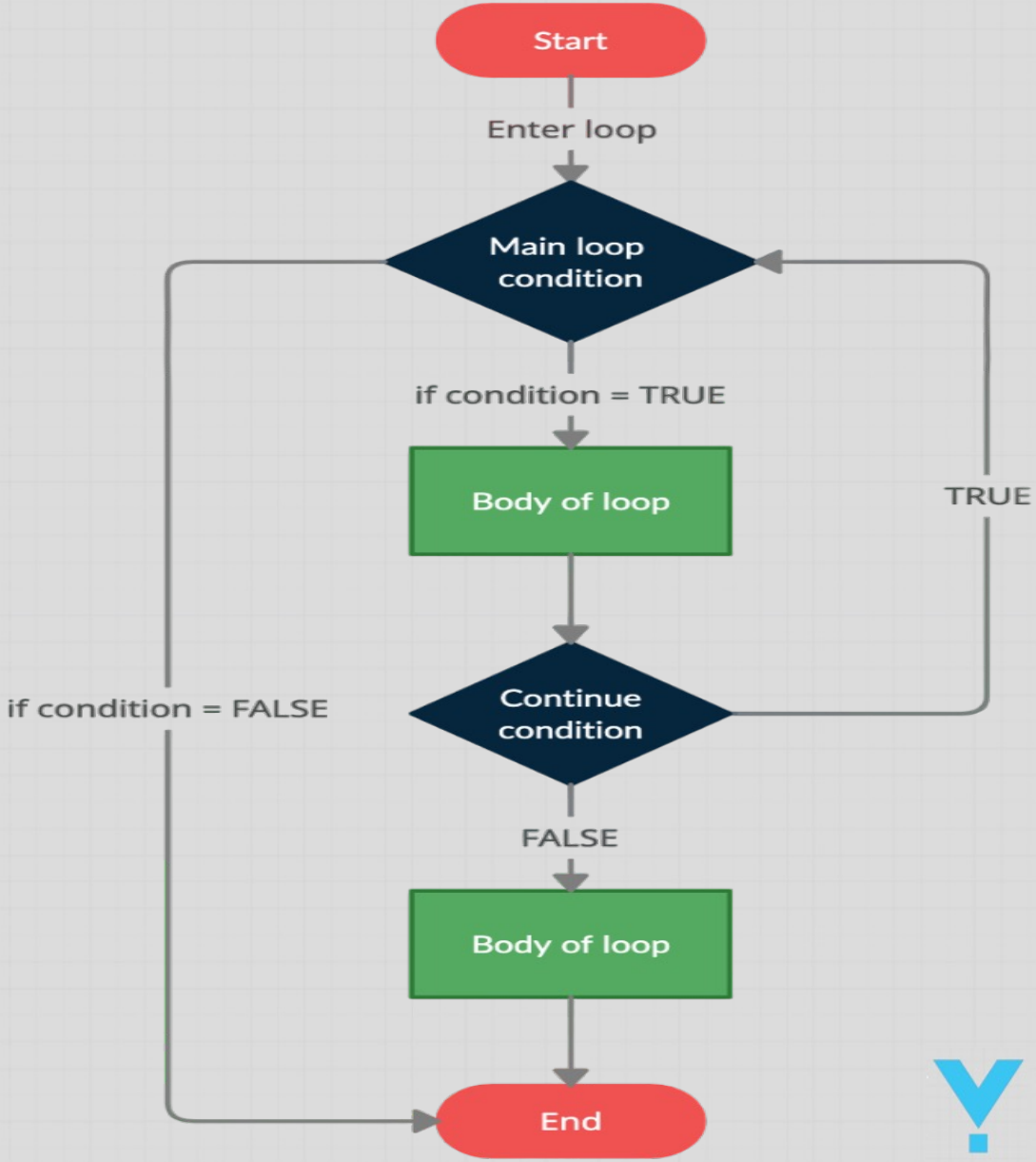
Break Statement

- Causes the termination of the loop
- Tells the interpreter to go on to the next statement of code outside of the loop



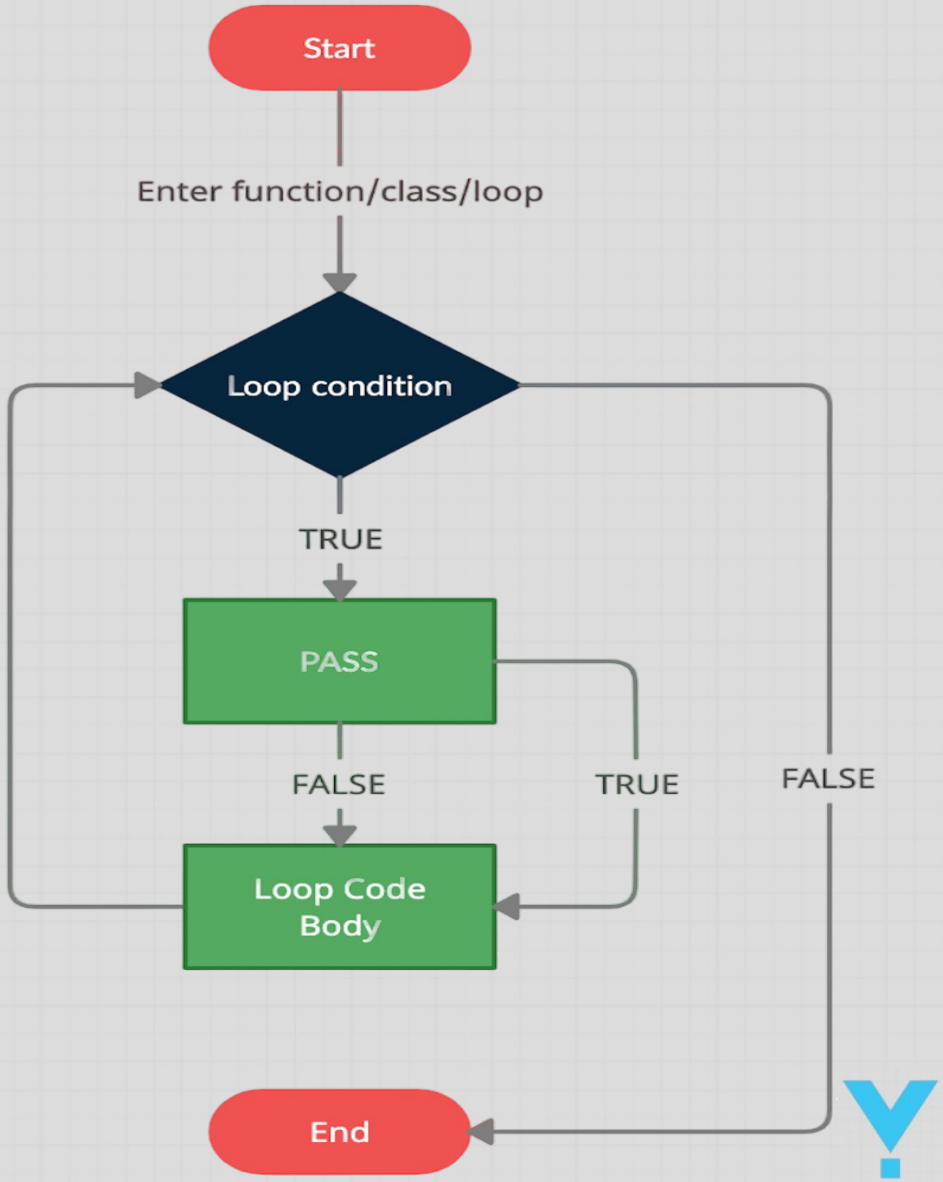
Continue Statement

- Skips the current iteration of the loop
- Tells the interpreter to jump to the next iteration



Pass Statement

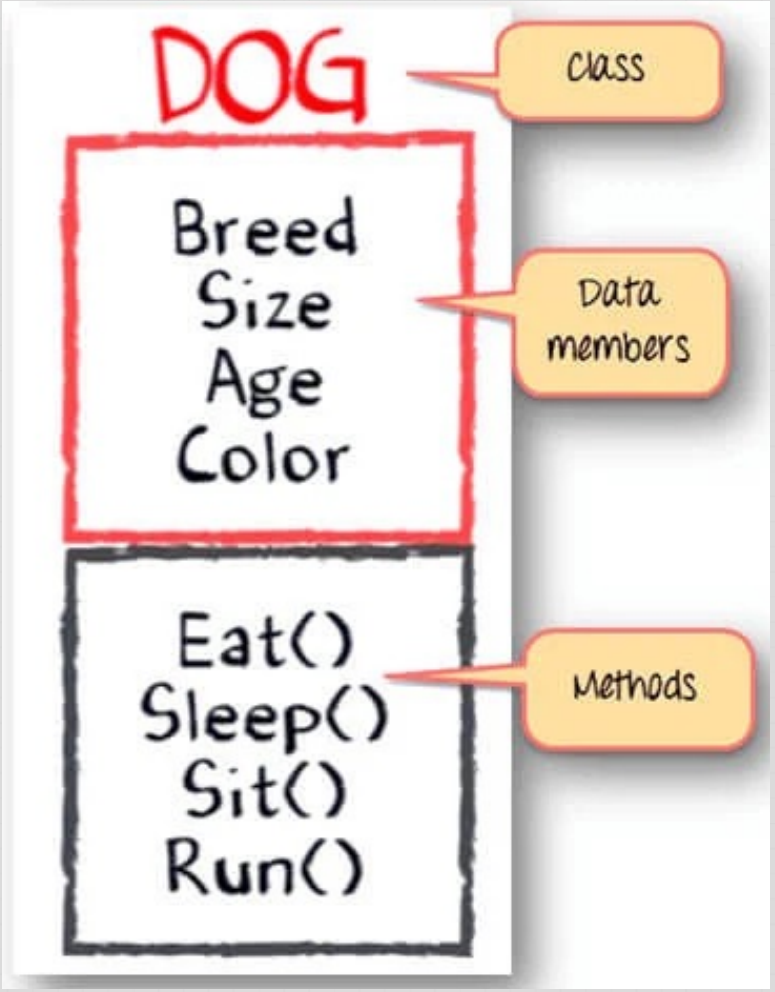
- Used as a placeholder in a loop/function/class
- Nothing happens when the pass is executed
- Results in no operation



What is A Class?

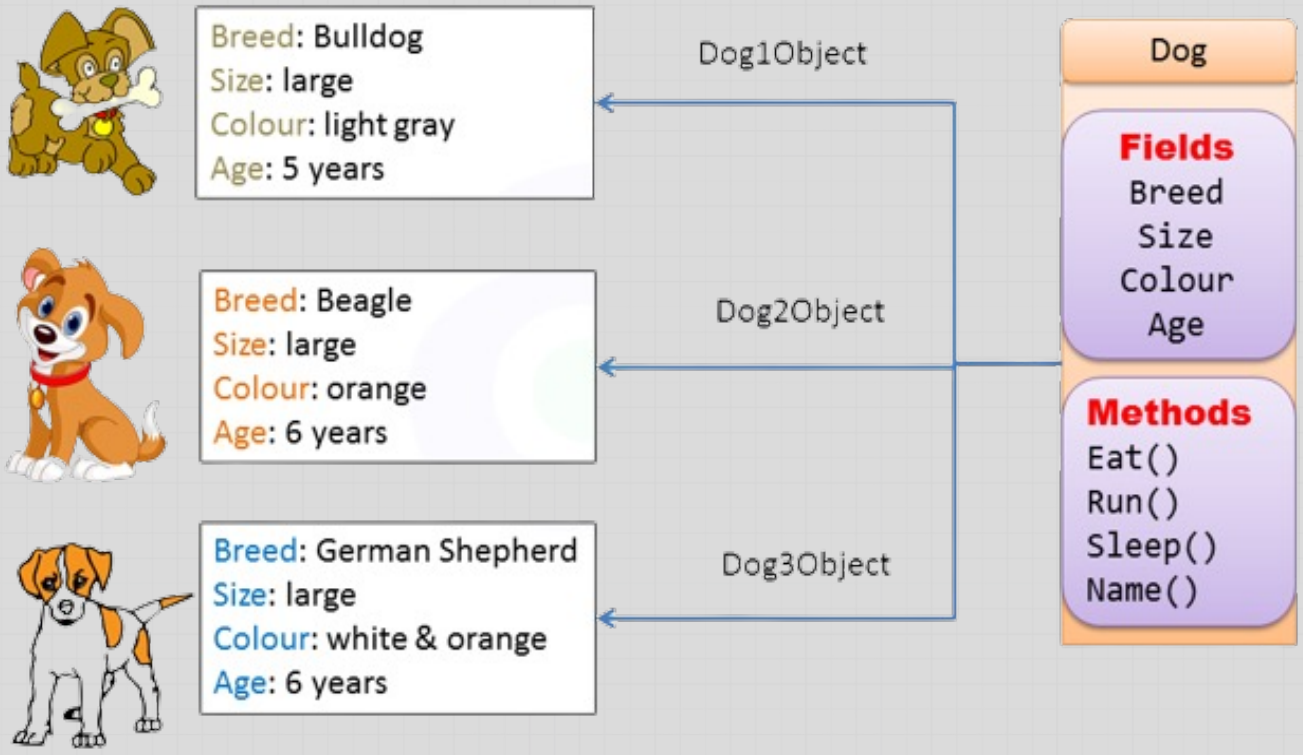
- Where objects came from
- A blueprint or set of instructions to build

  a specific type of Object
- No memory allocated for a class



What is An Object?

- An instance of a class
- Multiple objects can be created from a class
- Each object has its own memory
- The data stored in an object are called fields



Writing A Custom Class

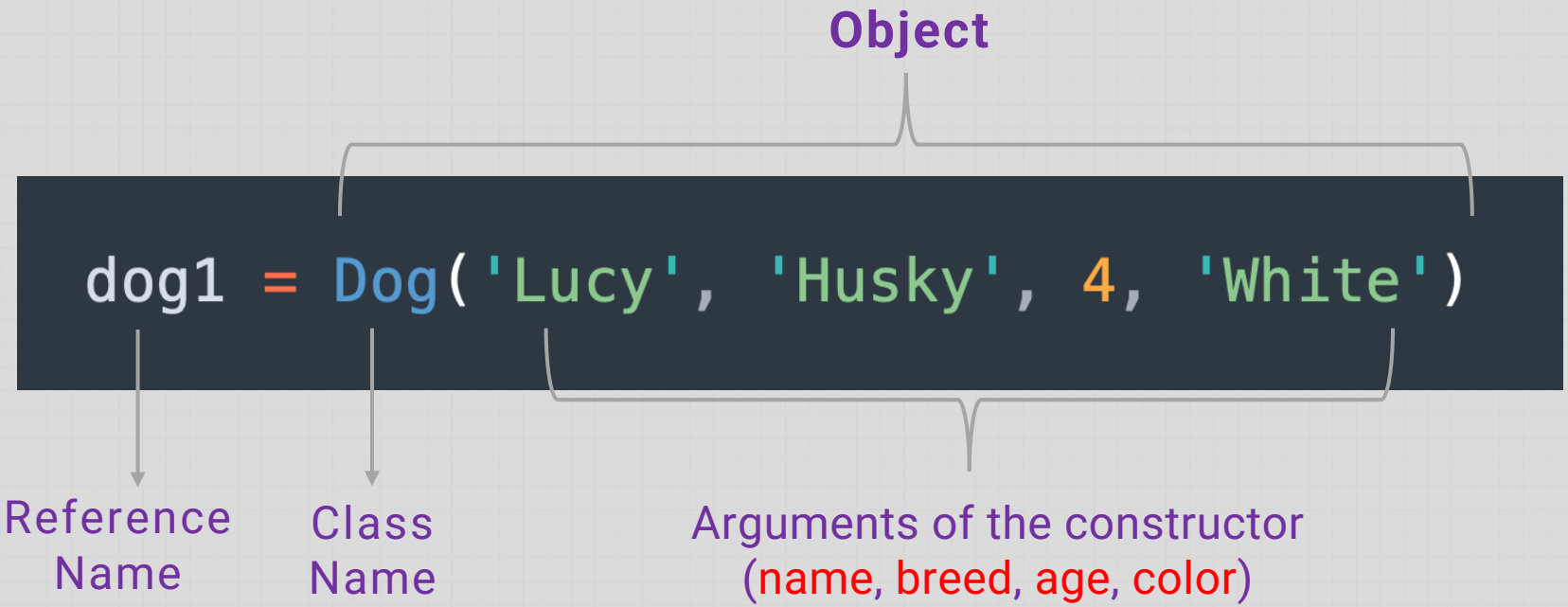
Class Name	Dog
Fields (Attributes)	name breed size age color ...
Methods (Actions)	eat() drink() play() ...

keyword

Class Name

```
class Dog:

    def __init__(self, name, breed, age, color):
        self.name = name
        self.breed = breed
        self.age = age
        self.color = color

    def eat(self):
        print(f'{self.name} + is eating dog food')

    def drink(self):
        print(f'{self.name} + is drinking water')

    def play(self):
        print(f'{self.name} + is playing')
```

Creating An Object/Instance



The __init()__ Method

- Build-in __init()__ method used for defining & initializing the attributes
- Belongs to the object, and each object has its own memory
- Gets executed when an object is created from the class

```
class Dog:

    def __init__(self, name, breed, age, color):
        self.name = name
        self.breed = breed
        self.age = age
        self.color = color
```

Object Methods

- Objects can share the methods created within the class
- Methods can be called through the object once it's instantiated

```
class Dog:

    def __init__(self, name, breed, age, color):
        self.name = name
        self.breed = breed
        self.age = age
        self.color = color

    def eat(self):
        print(f'{self.name} + is eating dog food')

    def drink(self):
        print(f'{self.name} + is drinking water')

    def play(self):
        print(f'{self.name} + is playing')
```

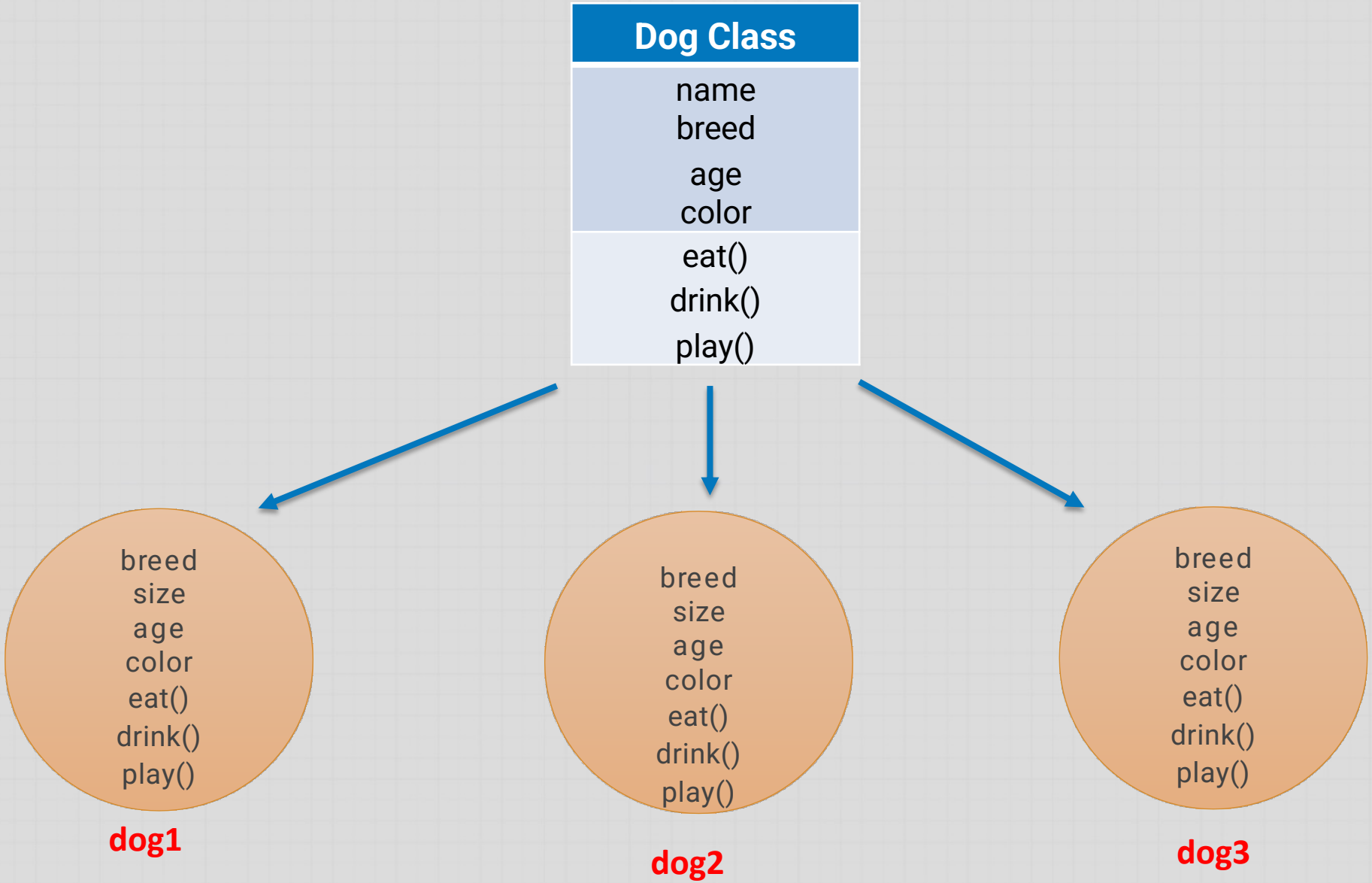
```
dog1 = Dog('Lucy', 'Husky', 4, 'White')
# Dog Object is created

dog1.eat()
dog1.drink()
dog1.play()
```

The first parameter in object methods

- The first parameter self keyword references the instance of the class
- Used for accessing the attributes of the class

```
def __init__(self, name, breed, age, color):
    self.name = name
    self.breed = breed
    self.age = age
    self.color = color

def eat(self):
    print(f'{self.name} + is eating dog food')

def drink(self):
    print(f'{self.name} + is drinking water')

def play(self):
    print(f'{self.name} + is playing')
```

Topic Example



Accessing an object's data and methods

- An Object's members refer to its data fields and methods. After the object is created its data can be accessed and its methods can be invoked using the dot operator (.)

```
dog1 = Dog('Lucy', 'Husky', 4, 'White')

print(dog1.name)
print(dog1.breed)
print(dog1.color)

dog1.eat()
dog1.drink()
dog1.play()
```

The __str()__ Method

- Build-in __str()__ method is used for controlling what should be returned when the class object is represented as a string

```
class Dog:

    def __init__(self, name, breed, age, color):
        self.name = name
        self.breed = breed
        self.age = age
        self.color = color

    def __str__(self):
        return f'Dog[name:{self.name}, breed:{self.breed}]'
```

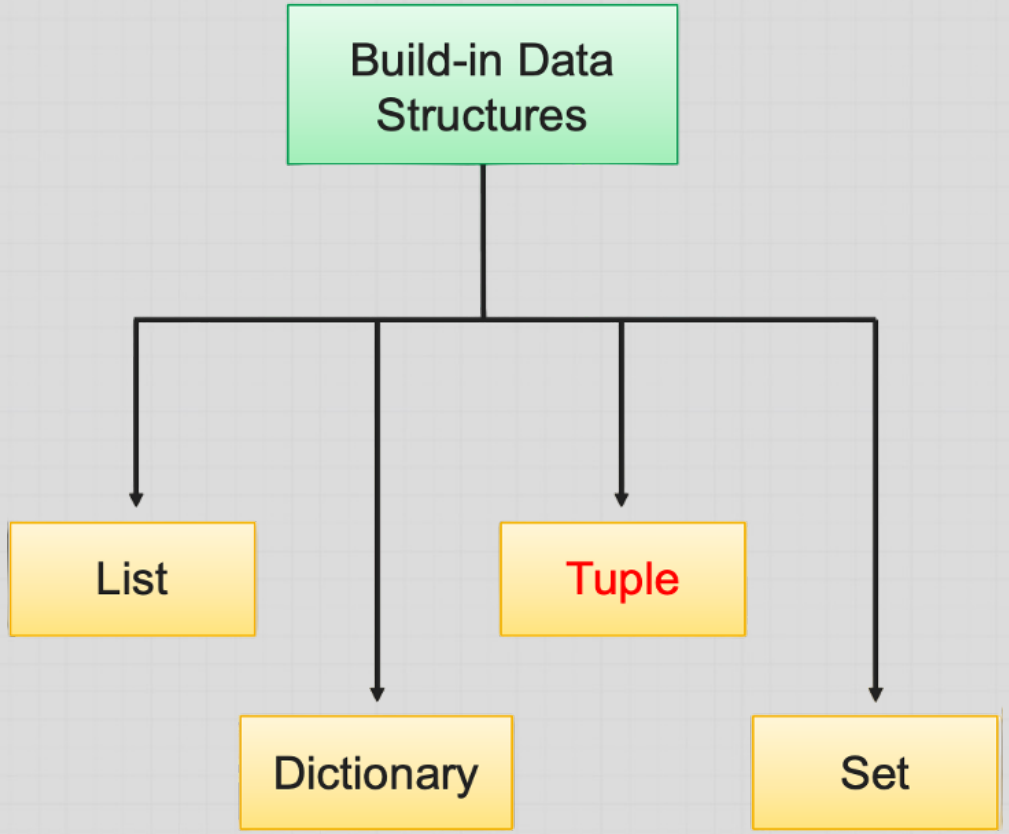
```
dog1 = Dog('Lucy', 'Husky', 4, 'White')

print(dog1)
# Dog[name:Lucy, breed:Husky]
```

Class vs Object

Class	Object
Class is a collection of similar objects	Object is an instance of a class
Class is conceptual (is a template)	Object is real
No memory is allocated for a class	Each object has its own memory
Class can exist without any objects	Objects can not exist without a class

Tuple

- A special type of variable
- Used to store multiple values of any types
- Size is fixed, and can not be increased/decreased
- The values in the tuple are unchangeable
- Every element in a tuple has 2 index numbers:
  - Forward index
  - Reverse index



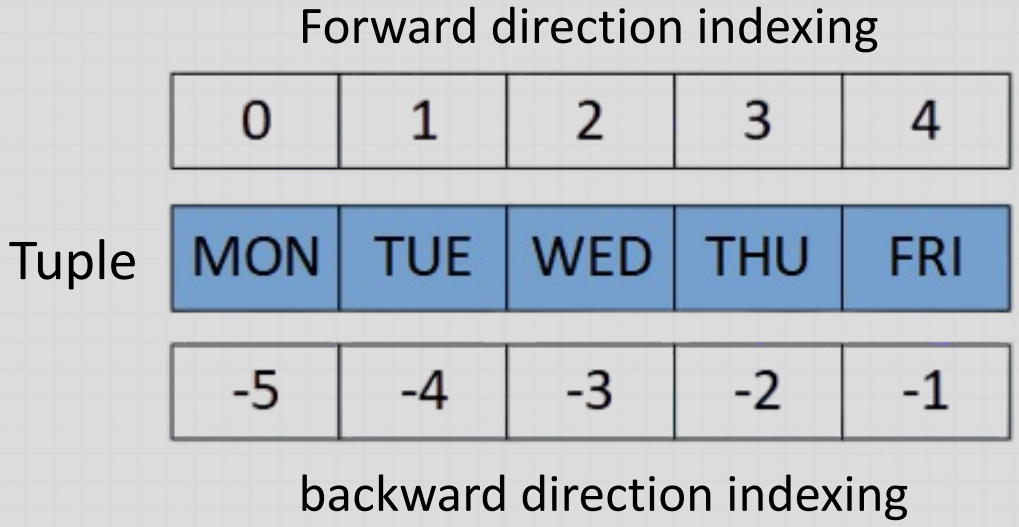
Creating A Tuple

- Created by placing all the elements inside parentheses (Optional) separated by commas
- A comma must be given after the element, otherwise, it won't be recognized as a tuple
- Elements are ordered, unchangeable, can be duplicated, and can be of any data type

```
days =("MON", "TUE", "WED", "THU", "FRI", 'SAT', 'SUN')

fruits = "Cherry", "Lemon", "Cherry", 'Orange', 'Kiwi'

scores = 75, 78, 85, 90, 93, 95, 85, 75, 86, 92, 85

tuple1 = ("A", 'B', 'C', 1, 2, 3, True, False)
```

Accessing Tuple Elements

- Elements of a tuple can be accessed by using the square brackets [ ]
- The index number (forward/backward index) of the element needs to be provided




```
days = ("MON", 'TUE', "WED", "THU", 'FRI')
print(days[0])  # prints "MON"
print(days[-1]) # prints "FRI"
```

Slicing Tuple: Start & End Indexes

- Creates a range of elements (sub-tuples) by using the slice syntax [start : end]
- We can specify the start index and end index (excluded), separated by a colon, to create the sub-tuples

```
days =("MON", "TUE", "WED", "THU", "FRI")

work_days = days[2:5]

print(work_days) # prints ('WED', 'THU', 'FRI')

good_days = days[1: 4]

print(good_days) # prints ('TUE', 'WED', 'THU')
```

Slices the tuple days starting from index 2 to index 5 (index 5 is excluded)

Slices the tuple days starting from index 1 to index 4 (index 4 is excluded)

Slicing Tuple: Slice From The Start

- By not giving the start index, the slicing starts from the first element [: end]

```
days =("MON", "TUE", "WED", "THU", "FRI")

work_days = days[:3]
print(work_days) # prints ('MON', 'TUE', 'WED')

numbers = 10, 20, 30, 40, 50, 60

some_nums = numbers[:3]
print(some_nums) # prints (10, 20, 30)
```

Slices the tuple days starting from index 0 to index 3 (index 3 is excluded)

Slices the tuple numbers starting from index 0 to index 3 (index 3 is excluded)

Slicing Tuple: Slice To The End

- By not giving the end index, the slicing starts from the start index to the end of the tuple [start :]

```
days =("MON", "TUE", "WED", "THU", "FRI")

work_days = days[3:]
print(work_days) # prints ('THU', 'FRI')

numbers = 10, 20, 30, 40, 50, 60

some_nums = numbers[3:]
print(some_nums) # prints (40, 50, 60)
```

Slices the tuple days starting from index 3 to the end

Slices the tuple numbers starting from index 3 to the end

Merging Tuples

- To merge two or more tuples, we can use the + operator to merge them

```
tuple1 = 10, 20, 30
tuple2 = (40, 50, 60)

numbers = tuple1 + tuple2

print(numbers)
# prints (10, 20, 30, 40, 50, 60)
```

```
tuple1 = ("Cherry", "Apple", "Banana")
tuple2 = ("Orange", "Wooden Spoon", "Lemon")
tuple3 = ("Eggs", "Milk", "Salt", "Sugar")

items = tuple1 + tuple2 + tuple3
```

Multiplying Tuples

- To multiply the content of a tuple, we can use * operator

```
tuple1 = (1, 2, 3)

new_tuple = tuple1 * 2

print(new_tuple)
# prints (1, 2, 3, 1, 2, 3)
```

```
tuple1 = ("Python",)

new_tuple = tuple1 * 2

print(new_tuple)
# prints ('Python', 'Python')
```

Tuple Methods

- Tuple has the following two build-in methods:
  - index(): returns the forward index number of a specified element from the tuple
  - count(): returns the frequency of a specified element from the tuple

```
numbers = (10, 20, 30, 40, 50, 60, 70, 10, 10, 10)

print(numbers.index(30))  # prints 2
print(numbers.index(60))  # prints 5

print(numbers.count(10))  # prints 4
print(numbers.count(200)) # prints 0
```