

## Constructors

- Constructors are generally **used for instantiating an object (initializing all variables of an object)**
- The **task of constructors is to initialize (assign values)** to the data members of the class when an object of the class is created.
- In Python, **the `__init__()` method is called the constructor.**
- The constructor **is always called when an object is created.**
- Without constructors, all objects will have the same values and no object will be unique.

### Syntax:

```
class classname:
```

```
    def __init__(self):
```

```
        # body of the constructor
```

## Creating a Constructor

To create a constructor in Python, we need to define a special method called `__init__()` inside our class.

### `__init__()`

- The `__init__` method is called as the special method in Python whose name 'init' is preceded and followed by the double underscore sign.
- It is called as the constructor method in Python.
- It is used to initializing the object of a class.
- It is always executed when the object of the class is created.
- Like normal methods, the `__inti__` also contains a set of statements that are executed at the time of object creation.

### Example:

Create a class named Person, use the `__init__()` function to assign values for name and age:

```
class Person:
```

```
    #Constructor or init method
```

```
    def __init__(self, name, age):
```

```
        self.name = name
```

```
        self.age = age
```

```
p1 = Person("John", 36)
```

```
p1.name
```

```
p1.age
```

### Output:

```
John
```

```
36
```

**Example:**

```
class Person:
    def __init__(self, name, age):
        self.name = name
        self.age = age

    def myfunc(self):
        print("Hello my name is " , self.name)

p1 = Person("John", 36)
p1.myfunc()
```

**Output:**

Hello My name is John

**Note:** We can use any name instead of *self*.

**Example:**

Use the words *mysillyobject* and *abc* instead of *self*:

```
class Person:
    def __init__(mysillyobject, name, age):
        mysillyobject.name = name
        mysillyobject.age = age

    def myfunc(abc):
        print("Hello my name is " , abc.name)

p1 = Person("John", 36)
p1.myfunc()
```

**Output:**

Hello My name is John

## Types of constructors

Constructors are categorized into three types:

1. Non-Parameterized Constructor
2. Parameterized Constructor
3. Default Constructor

### A. Non-Parameterized constructor:

- Constructors with no parameters other than self are called Non-Parameterized Constructors.
  - ✓ It **does not accept any arguments**.
  - ✓ Its definition **has only one argument** which is a reference to the object of the class.

#### Example

```
class A:
    def __init__(self):
        self.a = "Python for DS"

    def print(self):
        print(self.a)

obj = A()
obj.print()
```

#### Output :

Python for DS

#### Example:

```
class Dress:
    def __init__(self):
        self.cloth = "Cotton"
        self.type = "T-Shirt"

    def get_details(self):
        print("Cloth = ", self.cloth)
        print("\nType =", self.type)

t_shirt = Dress()
t_shirt.get_details()
```

#### Output

Cloth = Cotton  
Type = T-Shirt

## B. Parameterized constructor:

- Constructors with at least two parameters including self are called Parameterized Constructors.
- ✓ It takes **its first argument a self parameter which is as a reference to the object of the class.**
- ✓ The **rest of the arguments** are provided by the programmer while creating the object.

### Example:

```
class A:
    # Class Variable
    x = "Python"
    y = "DS"
    def __init__(self, name, age):
        # Instance Variable
        self.name = name
        self.age = age
    def func(self):
        print("Hello:", self.name)
        print("Your age is:", self.age)
```

```
obj = A('ABCD', 19)
print(obj.x)
print(obj.y)
obj.func()
```

### Output:

```
Python
DS
Hello: ABCD
Your age is: 19
```

### ➤ Example:

```
class Dress:
    def __init__(self, cloth, type, quantity=5):
        self.cloth = cloth
        self.type = type
        self.quantity = quantity
    def get_details(self):
        print(self.quantity, self.cloth, self.type)

shirt = Dress("silk", "shirt", 20)
t_shirt = Dress("cotton", "t-shirt")

shirt.get_details()
t_shirt.get_details()
```

### Output

```
20 silk shirt(s)
5 cotton t-shirt(s)
```

### Example:

```
class Addition:
    first = 0
    second = 0
    answer = 0
    def __init__(self, f, s):
        self.first = f
        self.second = s

    def display(self):
        print("First number = " , self.first)
        print("Second number = " , self.second)
        print("Addition of two numbers = " , self.answer)

    def calculate(self):
        self.answer = self.first + self.second

obj = Addition(1000, 2000)
obj.calculate()
obj.display()
```

#### Output:

```
First number = 1000
Second number = 2000
Addition of two numbers = 3000
```

## C. Default Constructor in Python

- If the user do not define a constructor, then a non-parameterized constructor with an empty body is initialized while creating the object of the class. This constructor is called Default Constructor.

#### Example:

```
class Dress:
    cloth = "silk"
    type = "shirt"
    def details(self):
        print("A", self.cloth, self.type)

shirt = Dress()
shirt.details()
```

#### Output

```
A silk shirt
```

#### Note:

##### What happen if we declare the two same constructors in the class?

Internally, the object of the class will always call the last constructor if the class has multiple constructors.

#### Example

```
class Student:
    def __init__(self):
        print("The First Constructor")
    def __init__(self):
        print("The second contructor")

st = Student()
```

#### Output:

```
The second contructor
```

# Additional Points:

## Example:

```
class car:
    def __init__(self,modelname, year):
        self.modelname = modelname
        self.year = year
    def display(self):
        print(self.modelname,self.year)
```

```
c1 = car("Toyota", 2016)
c1.display()
```

## Example:

**#Creating more than one object of a class**

```
class employee():
    def __init__(self,name,age,id,salary): //creating a function
        self.name = name // self is an instance of a class
        self.age = age
        self.salary = salary
        self.id = id
```

```
emp1 = employee("harshit",22,1000,1234) //creating objects
emp2 = employee("arjun",23,2000,2234)
```

**Note: We can use any name instead of self.**

## Example:

**#Use the words *mysillyobject* and *abc* instead of *self*:**

```
class Person:
    def __init__(mysillyobject, name, age):
        mysillyobject.name = name
        mysillyobject.age = age
```

```
def myfunc(abc):
    print("Hello my name is " , abc.name)
```

```
p1 = Person("John", 36)
p1.myfunc()
```

## Output:

Hello My name is John

**Note:**

**Example:**

**#Passing the wrong number of arguments.**

```
class Car:
    def __init__(self, name, mileage):
        self.name = name
        self.mileage = mileage
Honda = Car("Honda City")
print(Honda)
```

**Output:**

Error

**Example:**

**#Order of the arguments**

```
class Car:
    def __init__(self, name, mileage):
        self.name = name
        self.mileage = mileage

    def description(self):
        return f"The {self.name} car gives the mileage of {self.mileage}km/l"
Honda = Car(24.1, "Honda City")
print(Honda.description())
```

## Note:

### To add two numbers using function:

```
def add_number(n1,n2):  
    sum = n1 + n2;  
    return sum;  
num1 = 30  
num2 = 20  
print("The sum of two number is",add_number(num1,num2))
```

### To add two numbers using function inside a class:

```
class MyClass:  
    a = 10  
    b = 20  
    def add(self):  
        sum = self.a + self.b  
        print(sum)
```

```
ob = MyClass()  
print(ob.a)  
print(ob.b)  
ob.add()
```

### To add two numbers using Constructors:

```
class add:  
    def __init__(self,number1,number2):  
        self.addition = number1 + number2
```

```
addnumbers = add(10,15)  
print(addnumbers.addition)
```



## Note:

### Constructors with Positional Arguments

Positional arguments pass values to parameters depending on their position.

#### #Example: Positional Arguments

```
class Dress:
    def __init__(self, type, price):
        self.type = type
        self.price = price
    def details(self):
        print("A", self.type, "costs Rs." , self.price)
shirt = Dress("shirt", 50)
shirt.details()
```

#### Output

**A shirt costs Rs.50**

### Constructors with keyword arguments

Arguments which should be passed by using a parameter name and an equal to sign are called keyword arguments. They are independent of position and dependent on the name of the parameter.

#### Example:

```
class Dress:
    def __init__(self, type, price):
        self.type = type
        self.price = price

    def details(self):
        print("A", self.type, "costs Rs." , self.price)

t_shirt = Dress(price=150, type="t-shirt")
print(t_shirt.details())
```

## Constructors with Arbitrary Arguments

Multiple arguments which are passed into a single indefinite length tuple are called arbitrary arguments. We use arbitrary arguments when we don't know the number of arguments that will be passed to the function.

### Example:

```
class Dress:
    def __init__(self, *types):
        self.types = types
    def details(self):
        return self.types
t_shirt = Dress("shirt", "t-shirt")
print(t_shirt.details())
```

### Arbitrary Arguments

```
class Dress:
    def __init__(self, *types):
        self.types = types
    def details(self):
        return self.types
t_shirt = Dress("shirt", "t-shirt")
print(t_shirt.details())
```

```
class Square:
    def __init__(self, length):
        self.length = length
        self.area = self.find_area()
    def find_area(self):
        return self.length * self.length
obj = Square(5)
print(obj.area)
```

## Count Objects Using Constructor in Python

```
class Dress:
    def __init__(self):
        Dress.no_of_dresses += 1
    no_of_dresses = 0
print("Before Creating objects")
print(f"No of objects = {Dress.no_of_dresses}")
for _ in range(10): # To create 10 objects
    Dress()
print("After Creating objects")
print(f"No of objects = {Dress.no_of_dresses}")
```

### Output:

```
Before Creating objects
No of objects = 0
After Creating objects
No of objects = 10
```

## Delete the Object

We can delete the properties of the object or object itself by using the del keyword.

### Example

```
class Employee:
    id = 10
    name = "John"
    def display(self):
        print("ID: %d \nName: %s" % (self.id, self.name))

emp = Employee()
# Deleting the property of object
del emp.id
# Deleting the object itself
del emp
emp.display()
```