# Special Class Methods


*Essentially Python's version of Special Forces*

# What are"Special Methods":

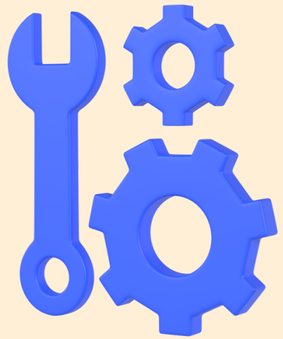
**Special Methods** are **automatically ran** when an object is created.

This is the **same thing that happens with __init__** as it's **automatically called when an object is created**.

Double-underscore methods make **operator overloading** possible.

This **gives extended meaning** beyond their predefined operational meaning

Special method ⟶ **__init__(**self, **)**



# List of "Special Methods":

| Syntax | What they do |
| --- | --- |
| __init__(self,) | Initializes -> Start. **Used to build** variables for the **object** |
| __del__(self) | Has the ability to **delete an object** |
| __str__(self) | **Returns the object** representation in a **string format** |
| __len__(self) | Allows you to **return the length of an Object** |
| __eq__(self) | Allows you to **compare two Objects** |
| __add__(self) | Allows you to **add two objects** |

# __str__() method:

This method provides a string representation of an object.

It's called by the built-in str() function and is commonly used to define a human-readable string representation of the object

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

    def __str__(self):
        return f"Name: {self.name}, Age: {self.age}"

person = Person( "John",  25 )
print( person )
```

We construct a string using the **name** and **age** properties. The string is formatted in a readable format that represents the Person's information.

# __str__() method:

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

    def __str__(self):
        return f"Name: {self.name}, Age: {self.age}"

person = Person( "John",  25 )
print( person )
```

When we **create an instance of the Person** class, such as **person**, and then print it using **print(person),** The **__str__()** method is automatically called.

It returns the string representation of the **person** object, which is then displayed in our Terminal

# __str__() method:

It's useful for providing a **concise representation of an object** when it is converted to a string.

Helps in debugging, logging, and **displaying object info in a human-readable format**

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

    def __str__(self):
        return f"Name: {self.name}, Age: {self.age}"

person = Person( "John",  25 )
print( person )
```

| Output in Terminal |
| --- |
| Name: John, Age: 25 |

| Without __str__method |
| --- |
| <__main__.Person object at 0x106378a00> |

# __del__() method:

Method that is called when an object is about to be destroyed. It's used to perform any final actions before the object is removed from memory

```
class File:
    def __init__(self, filename ):
        self.filename = filename

    def __del__(self):
        print(f"Deleting file: {self.filename}")

file = File("data.txt")
del file
```

Useful for performing **cleanup** actions, like releasing resources or closing connections, **before an object is destroyed**

It can be **helpful** in situations where **manual cleanup** is necessary.

Use pythons **del** statement on an object to use it

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class File:
    def __init__(self, filename ):
        self.filename = filename

    def __del__(self):
        print(f"Deleting file: {self.filename}")

file = File("data.txt")
del file
```

| Output in Terminal |
| --- |
| Deleting file: data.txt |

# __add__() method:

Special method that **allows objects of a class to be added together**

```
class Vector:
    def __init__(self, x, y ):
        self.x = x
        self.y = y

    def __add__(self, other):
        if isinstance(other, Vector):
            new_x = self.x + other.x
            new_y = self.y + other.y
            return Vector(new_x, new_y)
        else:
            raise TypeError("Unsupported type for +")

vector1 = Vector( 2, 3 )
vector2 = Vector( 4, 5 )
result = vector1 + vector2
print("New Object Values:", result.x, result.y)
```

Check **if other** is also an **object of the same class**

**If yes**, we **add** the corresponding **x and y** components of the two vectors

**Creating a new** Vector **object** with the result, and returning it

other ->python parameter that **represents another instance of this current class**

# __add__() method:

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class Vector:
    def __init__(self, x, y ):
        self.x = x
        self.y = y

    def __add__(self, other):
        if isinstance(other, Vector):
            new_x = self.x + other.x
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            return Vector(new_x, new_y)
        else:
            raise TypeError("Unsupported type for +")

vector1 = Vector( 2, 3 )
vector2 = Vector( 4, 5 )
result = vector1 + vector2
print("New Object Values:", result.x, result.y)
```

| Output in Terminal |
| --- |
| New Object Values: 6 8 |

# __sub__() method:

Special method that **allows objects of a class to be subtracted together**

```
class Vector:
    def __init__(self, x, y ):
        self.x = x
        self.y = y

    def __sub__(self, other):
        if isinstance(other, Vector):
            new_x = self.x - other.x
            new_y = self.y - other.y
            return Vector(new_x, new_y)
        else:
            raise TypeError("Unsupported type for -")

vector1 = Vector( 7, 4)
vector2 = Vector( 5, 8 )
result = vector1 - vector2
print("New Object Values:",result.x, result.y)
```

**Exact opposite of __add__**

| Output in Terminal |
| --- |
| New Object Values: 2 -4 |

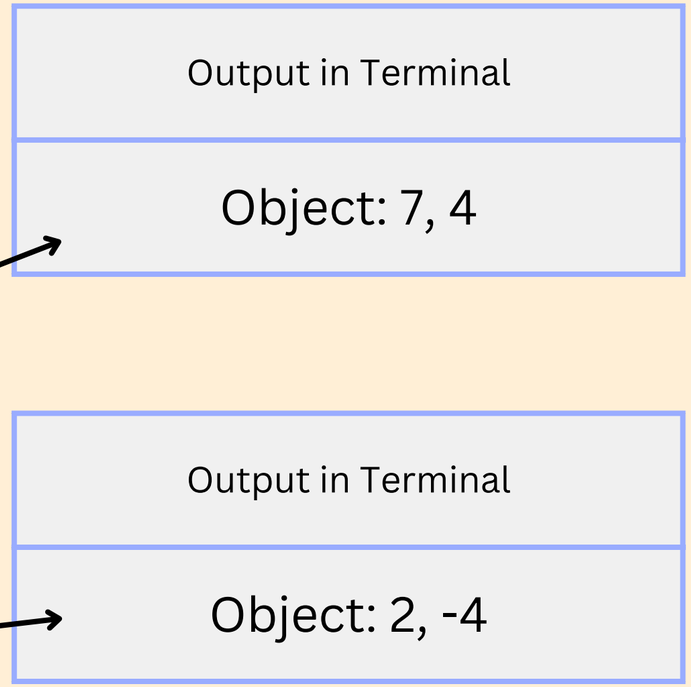
# Combining our Special Methods:

```
class Vector:
    def __init__(self, x, y ):
        self.x = x
        self.y = y

    def __sub__(self, other):
        if isinstance(other, Vector):
            new_x = self.x - other.x
            new_y = self.y - other.y
            return Vector(new_x, new_y)
        else:
            raise TypeError("Unsupported type for -")

    def __str__(self):
        return f"Object: {self.x}, {self.y}"

vector1 = Vector( 7, 4)
vector2 = Vector( 5, 8 )
res = vector1 - vector2
print(vector1)
print(res)
```



# __eq__() method:

Special method that **allows us to check if two objects are equal**

```
class Rectangle:
    def __init__(self, width, height):
        self.width = width
        self.height = height

    def __eq__(self, other):
        if isinstance(other, Rectangle):
            return self.width == other.width and self.height == other.height
        else:
            return False

r1 = Rectangle(3, 4)
r2 = Rectangle(3, 4)
r3 = Rectangle(5, 2)

print(r1 == r2)  # Output: True
print(r1 == r3)  # Output: False
```

We can use the **==** operator to **compare two objects.**

Python **automatically calls** the __eq__ method

***Python will call the method on the object to its left

# __eq__() method:

Special method that **allows us to check if two objects are equal**

```
class Rectangle:
    def __init__(self, width, height):
        self.width = width
        self.height = height

    def __eq__(self, other):
        if isinstance(other, Rectangle):
            return self.width == other.width and self.height == other.height
        else:
            return False

r1 = Rectangle(3, 4)
r2 = Rectangle(3, 4)
r3 = Rectangle(5, 2)

print(r1 == r2)  # Output: True
print(r1 == r3)  # Output: False
```

Check **if other** is also an **object of the same class**

**If yes**, check if objects have **same width/height**

**If yes**, return **True**

other ->python parameter that **represents another instance of this current class**


**Can you implement these methods on your own?**