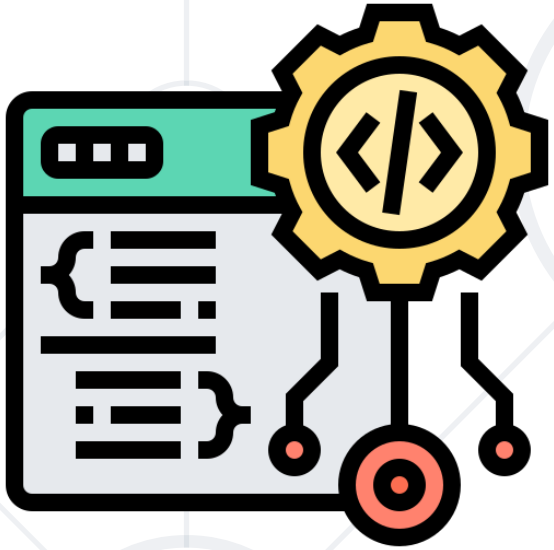
Class and Static Methods



SoftUni Team

Technical Trainers

Software University

SoftUni

Software University

https://softuni.bg

Table of Contents

Have a Question?

Software University

sli.do

#python-advanced

Static Methods

Static Methods

- It **knows nothing** about the **class** or **instance** it is called on
- It **cannot modify** object state or class state
- It could be put outside the class, but it is inside the class where it is **applicable**
- To turn a method into a static, we add a line with `@staticmethod` in front of the method header

Example: Static Methods

- To call a static method, we could use both the **instance**, or the **class**

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

    @staticmethod
    def is_adult(age):
        return age >= 18

print(Person.is_adult(5))    # False
girl = Person("Amy")
print(girl.is_adult(20))     # True
```

It does not take a self parameter

Benefits

- Shows that a particular method is **independent** from everything else around it
- Often helps to **avoid accidentals modifications** that go against the original design
- Communicates and enforces **developer intent** about the **class design**
- It is much **easier to test** since it is completely independent from the rest of the class

Problem: Calculator

- Follow the instructions in the lab document and create a class called `Calculator` with the following `static` methods
  - `add(*args)`
  - `multiply(*args)`
  - `divide(*args)`
  - `subtract(*args)`

Skeleton: Calculator

```
class Calculator:
    @staticmethod
    def add(*args):
        pass
    @staticmethod
    def multiply(*args):
        pass
    @staticmethod
    def divide(*args):
        pass
    @staticmethod
    def subtract(*args):
        pass
```

Class Methods

Class Methods

- It is **bound to the class** and not the object of the class
- It can **modify a class state** that would apply across all the instances of the class
- To turn a method into a class method, we add a line with `@classmethod` in front of the method header

Example: Class Methods

- We generally use class method to **create factory methods**

```
class Pizza:
    def __init__(self, ingredients):
        self.ingredients = ingredients

    @classmethod
    def pepperoni(cls):
        return cls(["tomato sauce", "parmesan", "pepperoni"])

    @classmethod
    def quattro_formaggi(cls):
        return cls(["mozzarella", "gorgonzola", "fontina", "parmigiano"])


first_pizza = Pizza.peperoni()
second_pizza = Pizza.quattro_formaggi()
```

We could create different pizzas easily

Benefits

- Simply provide a **shortcut** for creating new instance objects
- Ensures **correct instance creation** of the derived class
- You could **easily follow** the Don't Repeat Yourself (DRY) principle using class methods

Problem: Shop

- Follow the instructions in the lab document and create a class called **Shop** with the following methods
  - `small_shop(name: str, type: str)`
  - `add_item(item_name: str)`
  - `remove_item(item_name: str, amount: int)`
  - `__repr__()`

Skeleton: Shop

```
class Store:
    def __init__(self, name, type, capacity):
        pass
    @classmethod
    def small_shop(cls, name, type):
        pass
    def add_item(self, item_name):
        pass
    def remove_item(self, item_name, count):
        pass
    def __repr__(self):
        pass
```

Problem: Integer

- Follow the instructions in the lab document and create a class called `Integer` with the following methods
  - `from_float(value)`
  - `from_roman(value)`
  - `from_string(value)`

Skeleton: Integer

Software University

```
class Integer:
    def __init__(self, value):
        self.value = value
    @classmethod
    def from_float(cls, float_value):
        pass
    @classmethod
    def from_roman(cls, value):
        pass
    @classmethod
    def from_string(cls, value):
        pass
```

Overriding Using Class Methods

Overriding Using Methods

Software University

```
class Person:
    min_age = 0
    max_age = 150

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

    @staticmethod
    def __validate_age(value):
        if value < Person.min_age or \
           value > Person.max_age:
            raise ValueError()

    @property
    def age(self):
        return self.__age

    @age.setter
    def age(self, value):
        self.__validate_age(value)
        self.__age = value
```

```
class Employee(Person):
    min_age = 16
    max_age = 150

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

    @staticmethod
    def __validate_age(value):
        if value < Employee.min_age or \
           value > Employee.max_age:
            raise ValueError()

    @property
    def age(self):
        return self.__age

    @age.setter
    def age(self, value):
        self.__validate_age(value)
        self.__age = value
```

Override all the methods below

Overriding Using a Class Method (1)

- If the methods **do not rely on state** and they **are the same**, they could be optimized using **@classmethod**

```
class Person:
    min_age = 0
    max_age = 150

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

    @classmethod
    def __validate_age(cls, value):
        raise ValueError(f'{value} must be between '
                         f'{cls.min_age} and {cls.max_age}')
# __validate_age() takes the class attributes of class Person
```

Overriding Using a Class Method (2)

Software University

```
    @property
    def age(self):
        return self.__age

    @age.setter
    def age(self, value):
        self.__validate_age(value)
        self.__age = value

class Employee(Person):
    min_age = 16
# __validate_age() takes the class attribute min_age of class Employee

    def __init__(self, name, age, salary):
        super().__init__(name, age) # when checking the age of the Employee
        self.salary = salary
```

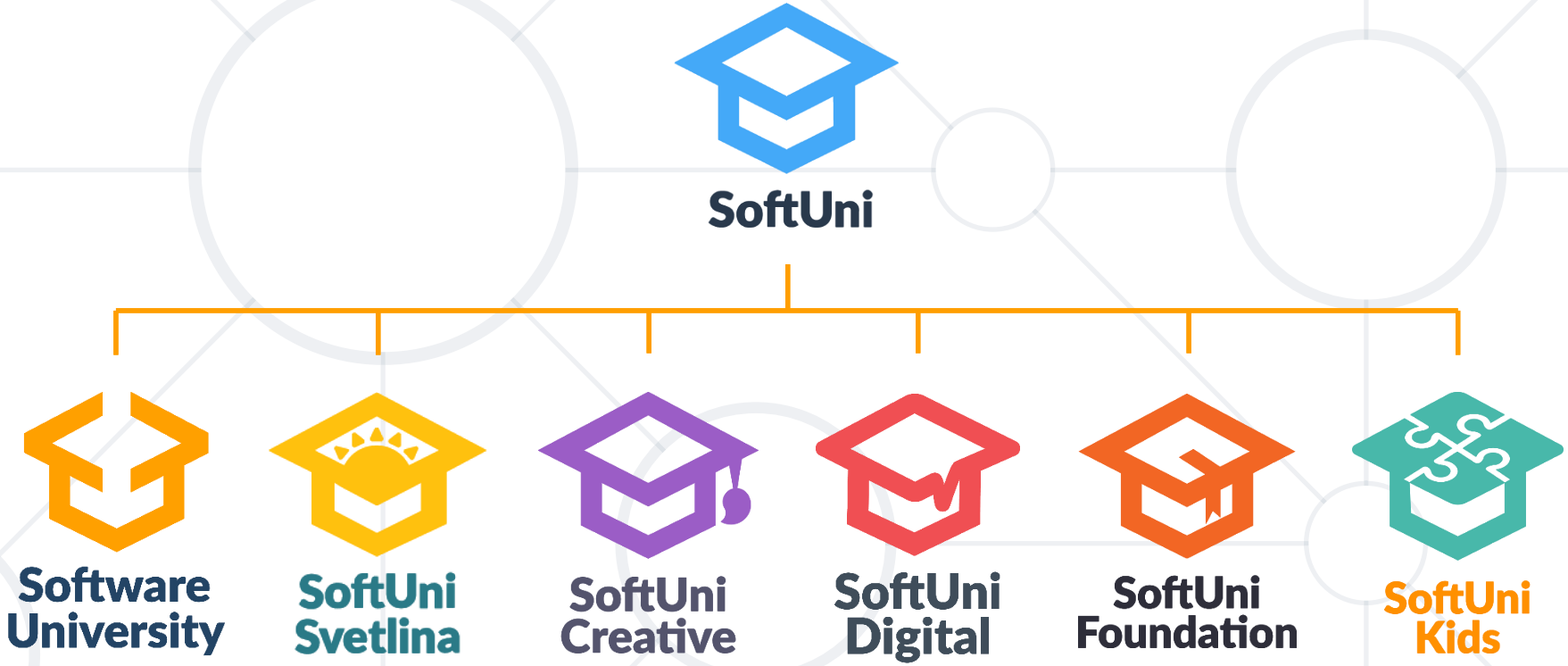
Practice

Live Exercise in Class (Lab)

Summary

- A **static method** is a method that **knows nothing** about the **class** or **instance** it is called on
- A **class method**, on the other hand, is **bound to the class** and not the object of the class

Questions?



SoftUni Diamond Partners

Software University

SCHWARZ

LIDL

Kaufland

SCHWARZ Produktion

prezero

Coca-Cola HBC Bulgaria

POKERSTARS | CAREERS

Postbank

Решения за твоето утре

AMBITIONED

DXC TECHNOLOGY

SOFTWARE GROUP

Bosch.IO

INDEAVR

Serving the high achievers

DRAFT KINGS

PHAR VISION

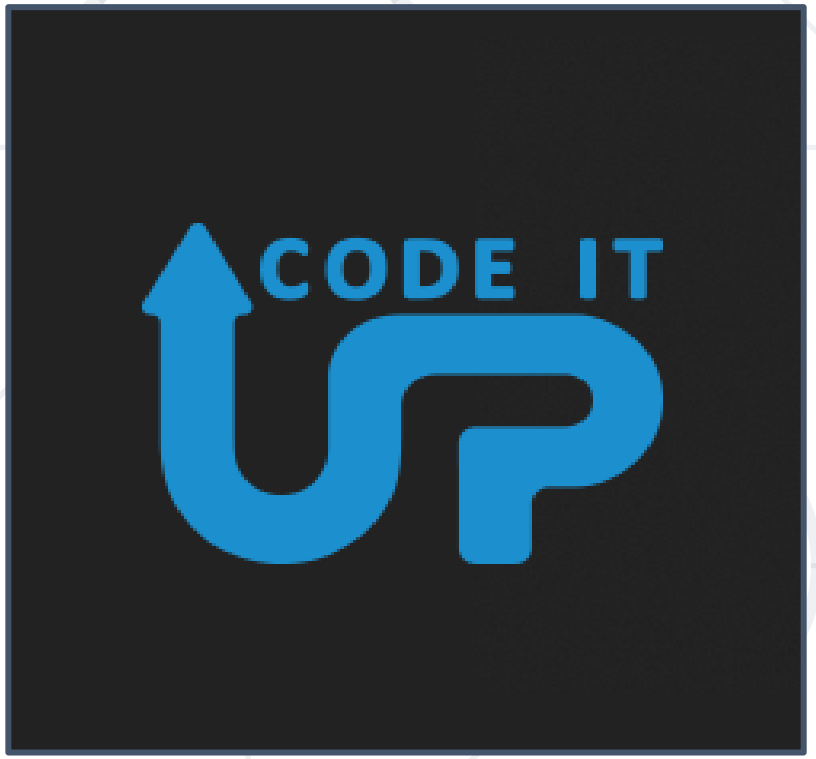
SmartIT

createX

SUPER HOSTING .BG

Educational Partners

Software University



Trainings @ Software University (SoftUni)

- Software University – High-Quality Education, Profession and Job for Software Developers
  - softuni.bg, softuni.org
- Software University Foundation
  - softuni.foundation
- Software University @ Facebook
  - facebook.com/SoftwareUniversity
- Software University Forums
  - forum.softuni.bg

License

- This course (slides, examples, demos, exercises, homework, documents, videos, and other assets) is **copyrighted content**
- Unauthorized copy, reproduction, or use is illegal
- © SoftUni – https://about.softuni.bg
- © Software University – https://softuni.bg