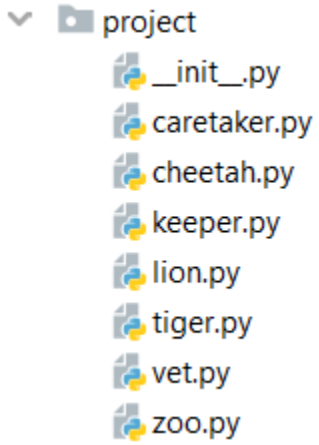
Exercise: Encapsulation

1. Wild Cat Zoo

In this exercise we are going to create a whole project called "**Wild Cat Zoo**". We are going to create the project step-by-step starting with the project structure:



Please create separate file for each class as shown above and submit a zip file containing all files (zip the whole project folder/module) - it is important to include all files in project module in order to be able to make proper imports.

Class Lion

Attributes

Public attribute **`name: string`**

Public attribute **`gender: string`**

Public attribute **`age: number`**

Methods

`__init__(name, gender, age)` - set all the attributes to the given ones

`get_needs()` - returns the number **50** (amount of money needed to tend the animal)

`__repr__()` - returns string representation of the lion in the format: **`"Name: {name}, Age: {age}, Gender: {gender}"`**

Class Tiger

Attributes

Public attribute **`name: string`**

Public attribute **`gender: string`**

Public attribute **`age: number`**

Methods

`__init__(name, gender, age)` - set all the attributes to the given ones

`get_needs()` - returns the number **45** (amount of money needed to tend the animal)

`__repr__()` - returns string representation of the tiger in the format: **`"Name: {name}, Age: {age}, Gender: {gender}"`**

Class Cheetah

Attributes

Public attribute **`name: string`**

Public attribute **`gender: string`**

Public attribute **`age: number`**

Methods

`__init__(name, gender, age)` - set all the attributes to the given ones

`get_needs()` - returns the number **`60`** (amount of money needed to tend the animal)

`__repr__()` - returns string representation of the cheetah in the format: **`"Name: {name}, Age: {age}, Gender: {gender}"`**

Class Keeper

Attributes

Public attribute **`name: string`**

Public attribute **`age: number`**

Public attribute **`salary: number`**

Methods

`__init__(name, age, salary)` - set all the attributes to the given ones

`__repr__()` - returns string representation of the keeper in the format: **`"Name: {name}, Age: {age}, Salary: {salary}"`**

Class Caretaker

Attributes

Public attribute **`name: string`**

Public attribute **`age: number`**

Public attribute **`salary: number`**

Methods

`__init__(name, age, salary)` - set all the attributes to the given ones

`__repr__()` - returns string representation of the caretaker in the format: **`"Name: {name}, Age: {age}, Salary: {salary}"`**

Class Vet

Attributes

Public attribute **`name: string`**

Public attribute **`age: number`**

Public attribute **`salary: number`**

Methods

`__init__(name, age, salary)` - set all the attributes to the given ones

`__repr__()` - returns string representation of the vet in the format: **`"Name: {name}, Age: {age}, Salary: {salary}"`**

Class Zoo

Attributes

Private attribute **`animal_capacity: number`**

Private attribute **`workers_capacity: number`**

Private attribute **`budget: number`**

Public attribute **`name: string`**

Public attribute **`animals: list (empty upon initialization)`**

Public attribute **`workers: list (empty upon initialization)`**

Methods

`__init__(name, budget, animlal_capacity, workers_capacity)` - set the attributes to the given ones

`add_animal(animal, price)`

- If you have **enough budget** and **capacity add** the animal (instance of **`Lion`**/**`Tiger`**/**`Cheetah`**) to the **animals list**, **reduce** the **budget** and **return** **`"{name} the {type of animal (Lion/Tiger/Cheetah)} added to the zoo"`**
- If you have capacity, but **no budget**, return **`"Not enough budget"`**
- In any other case, you **don't have space** and you should return **`"Not enough space for animal"`**

`hire_worker(worker)`

- If you have **enough space** for the worker (instance of **`Keeper`**/**`Caretaker`**/**`Vet`**), **add him** to the workers and return **`"{name} the {type(Keeper/Vet/Caretaker)} hired successfully"`**
- Otherwise return **`"Not enough space for worker"`**

`fire_worker(worker_name)`

- If there **is a worker** with that name in the workers list, **remove** him and return **`"{worker_name} fired successfully"`**
- Otherwise return **`"There is no {worker_name} in the zoo"`**

`pay_workers()`

- If you have **enough budget** to pay the workers (sum their salaries) **pay them** and return **`"You payed your workers. They are happy. Budget left: {left_budget}"`**
- Otherwise return **`"You have no budget to pay your workers. They are unhappy"`**

`tend_animals()`

- If you have **enough budget** to tend the animals **reduce the budget** and return **`"You tended all the animals. They are happy. Budget left: {left_budget}"`**
- Otherwise return **`"You have no budget to tend the animals. They are unhappy."`**

`profit(amount)`

- **Increase the budget** with the given amount of profit

animals_status()

- Returns the following string:

```
You have {total_animals_count} animals
----- {amount_of_lions} Lions:
{lion1}
…
----- {amount_of_tigers} Tigers:
{tiger1}
…
----- {amount_of_cheetahs} Cheetahs:
{cheetah1}
…
```

- ***Hint***: use the **__repr__** methods of the animals to print them on the console

workers_status()

- Returns the following string:

```
You have {total_workers_count} workers
----- {amount_of_keepers} Keepers:
{keeper1}
…
----- {amount_of_caretakers} Caretakers:
{caretaker1}
…
----- {amount_of_vetes} Vets:
{vet1}
…
```

- ***Hint***: use the **__repr__** methods of the workers to print them on the console

Examples

Test Code

`zoo = Zoo("Zootopia", 3000, 5, 8)`
 	
`# Animals creation`
`animals = [Cheetah("Cheeto", "Male", 2), Cheetah("Cheetia", "Female", 1),`
`Lion("Simba", "Male", 4), Tiger("Zuba", "Male", 3), Tiger("Tigeria", "Female", 1),`
`Lion("Nala", "Female", 4)]`
 	
`# Animal prices`
`prices = [200, 190, 204, 156, 211, 140]`
 	
`# Workers creation`
`workers = [Keeper("John", 26, 100), Keeper("Adam", 29, 80), Keeper("Anna", 31, 95),`
`Caretaker("Bill", 21, 68), Caretaker("Marie", 32, 105), Caretaker("Stacy", 35, 140),`
`Vet("Peter", 40, 300), Vet("Kasey", 37, 280), Vet("Sam", 29, 220)]`
 	
`# Adding all animals`
`for i in range(len(animals)):`

```
    animal = animals[i]
    price = prices[i]
    print(zoo.add_animal(animal, price))

# Adding all workers
for worker in workers:
    print(zoo.hire_worker(worker))

# Tending animals
print(zoo.tend_animals())

# Paying keepers
print(zoo.pay_workers())

# Fireing worker
print(zoo.fire_worker("Adam"))

# Printing statuses
print(zoo.animals_status())
print(zoo.workers_status())
```

Output

```
Cheeto the Cheetah added to the zoo
Cheetia the Cheetah added to the zoo
Simba the Lion added to the zoo
Zuba the Tiger added to the zoo
Tigeria the Tiger added to the zoo
Not enough space for animal
John the Keeper hired successfully
Adam the Keeper hired successfully
Anna the Keeper hired successfully
Bill the Caretaker hired successfully
Marie the Caretaker hired successfully
Stacy the Caretaker hired successfully
Peter the Vet hired successfully
Kasey the Vet hired successfully
Not enough space for worker
You tended all the animals. They are happy. Budget left: 1779
You payed your workers. They are happy. Budget left: 611
Adam fired successfully
You have 5 animals
----- 1 Lions:
Name: Simba, Age: 4, Gender: Male
----- 2 Tigers:
Name: Zuba, Age: 3, Gender: Male
Name: Tigeria, Age: 1, Gender: Female
----- 2 Cheetahs:
Name: Cheeto, Age: 2, Gender: Male
Name: Cheetia, Age: 1, Gender: Female
You have 7 workers
----- 2 Keepers:
Name: John, Age: 26, Salary: 100
Name: Anna, Age: 31, Salary: 95
----- 3 Caretakers:
Name: Bill, Age: 21, Salary: 68
Name: Marie, Age: 32, Salary: 105
Name: Stacy, Age: 35, Salary: 140
```

```
----- 2 Vets:
Name: Peter, Age: 40, Salary: 300
Name: Kasey, Age: 37, Salary: 280
```

2. Pizza Calories

Class Toppings

Attributes

Private attribute **`topping_type: string`**

Private attribute **`weight: double`**

Methods

`__init__( topping_type, weight)` - set all the attributes to the given ones

Getters and **Setters** to all of the private attributes

Class Dough

Attributes

Private attribute **`flour_type: string`**

Private attribute **`baking_technique: string`**

Private attribute **`weight: double`**

Methods

`__init__(flour_type, baking_technique, weight)` - set all the attributes to the given ones

Getters and **Setters** to all of the private attributes

Class Pizza

Attributes

Private attribute **`name: string`**

Private attribute **`dough: Dough`**

Private attribute **`toppings: dictionary`**

Private attribute **`toppings_capacity: number`**

Methods

`__init__(name, dough, toppings_capacity)` - set all the attributes to the given ones. Also, **initialize an empty toppings dictionary**. It will contain the **topping type as a key** and the **topping's weight as a value**.

Getters and **Setters** to all of the private attributes

`add_topping(topping: Topping)` - Adds a new topping to the dictionary.

- If there is **no space left** for **a new topping**, raise a **ValueError**: **`"Not enough space for another topping"`**

- If the topping is **already in the dictionary**, **increase the value of its weight**.

`calculate_total_weight()` - returns the total weight of the pizza.

3. Football Team Generator

Class Player

Attributes

Private attribute **`name: string`**

Private attribute **`endurance: number`**

Private attribute **`sprint: number`**

Private attribute **`dribble: number`**

Private attribute **`passing: number`**

Private attribute **`shooting: number`**

Methods

`__init__(name, endurance, sprint, dribble, passing, shooting)` - set all the attributes to the given ones.

Getters and **Setters** to all of the private attributes

`__str__()` - should return:

```
"Player: {name}
Endurance: {endurance}
Sprint: {sprint}
Dribble: {dribble}
Passing: {passing}
Shooting: {shooting}
"
```

Note: There is a **new line at the end** of the **`__str__()`**!!!

Class Team

Attributes

Private attribute **`name: string`**

Private attribute **`rating: number`**

Private attribute **`players: list`**

Methods

`__init__( name, rating)` - set all the attributes to the given ones. Also, initialize a **new collection, containing** all of the **players**.

Getters and **Setters** to all of the private attributes

`add_player(player: Player)` - adds a new player to the team.

- If the player **is already in the team**, return **`"Player {name} has already joined"`**
- **Add the player** to the team and return **`"Player {name} joined team {team_name}"`**

`remove_player(player_name: str)` - removes a player by its given name

- **Remove the player** and **return him**
- If the player **is not in the team**, return **`"Player {player_name} not found"`**