CSC148 Worksheet 6 Solution

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Question 1

- The two classes already defined are: Vehicle and SuperDuperManager

  The additional classes required to create for this exercise are: Car, Helicopter and MagicCarpet

  Car, Helicopter and MagicCarpet are child classes of Vehicle.

Question 2

a. The following are attributes possessed by all vehicles

- type
- initial_position
- moves_to
- move_diagonally
- fuel_usage

Correct Solution:

The following are attributes possessed by all vehicles

- position
- fuel

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b. No. Referencing the following code in *worksheet_6_starter_code.py*,

```
1    class Vehicle:
2        ...
3
4        def __init__(self, initial_fuel: int,
5                          initial_position: Tuple[int, int]) -> None:
6            ...
7
8            self.fuel = initial_fuel
9            self.position = initial_position
10
```

we can come up with the following examples.

- Vehicle(100, (10,20))
- Vehicle(50, (5, 10))

Here, we can see the two vehicles have different value of fuel and initial position.

c. *fuel_needed* not implemented because each child classes have different fuel consumption rate, and the method is to be defined by the child classes by overriding it.

d. The following methods must be defined in each of its subclasses

- Car
  - fuel_needed
  - move
- Helicopter
  - fuel_needed
  - move
- MagicCarpet
  - __init__
  - move

Correct Solution:

- Car
  - __init__
    * Necessary because the parameter *position* must be set as optional
    * Necessary because *self.position* must default to (0,0) if the argument of position not given.
  - fuel_needed
    * Necessary because vehicle uses fuel

* Necessary because needs to define the fuel cost based on it not being able to moving diagonally.

- **Helicopter**
  - __init__
    * Necessary because the parameter *position* must be set as optional
    * Necessary because *self.position* must default to (3,5) if the argument of position not given.
  - fuel_needed
    * Necessary because vehicle uses fuel
    * Necessary because needs to define the fuel cost based on it being able to move diagonally.

- **MagicCarpet**
  - __init__
    * Necessary to set the parameters *initial_fuel, initial_position* as optional
    * Necessary to randomize the value of *self.position.*
  - move
    * Necessary to set the parameters *new_x* and *new_y* as optional.
    * Necessary to randomize the value of new position.

Question 3

```
1    """
2    Initializing SuperDuperManager:
3    >>> s = SuperDuperManager()
4    >>> s._vehicles
5    {}
6
7    Adding Vehicles:
8    >>> s.add_vehicle('Car', '1', 100)
9    >>> s._vehicles['1'].__class__.__name__
10   'Car'
11   >>> s.add_vehicle('Helicopter', '1', 100)
12   >>> s._vehicles['1'].__class__.__name__
13   'Car'
14
15   >>> s.add_vehicle('Helicopter', '2', 100)
16   >>> s._vehicles['2'].__class__.__name__
17   'Helicopter'
18
19   >>> s.add_vehicle('UnreliableMagicCarpet','3',100)
20   >>> s._vehicles['3'].__class__.__name__
21   'UnreliableMagicCarpet'
```

```
22
23      Moving Vehicle:
24      >>> s._vehicles['1'].position
25      (0,0)
26      >>> s.move_vehicle('1', 1, 1)
27      >>> s._vehicles['1'].position
28      (1,1)
29
30      >>> s._vehicles['2'].position
31      (3,5)
32      >>> s.move_vehicle('2', 1, 1)
33      >>> s._vehicles['2'].position
34      (4,6)
35
36      >>> s._vehicles['3'].position
37      (4,8)
38      >>> s._vehicles['3'].position
39      (12,4)
40      >>> s.move_vehicle('3', 1, 1)
41      >>> s._vehicles['3'].position
42      (100,100)
43
44      Get Vehicle Position:
45      >>> s.get_vehicle_position('1')
46      (1,1)
47
48      >>> s.get_vehicle_position('2')
49      (4,6)
50
51      >>> s.get_vehicle_position('3')
52      (50,200)
53
54      Get Vehicle Fuel:
55      >>> s.get_vehicle_fuel('1')
56      98
57
58      >>> s.get_vehicle_fuel('2')
59      99
60
61      >>> s.get_vehicle_fuel('2')
62      100
63      """
```

Question 4

a. The instance attribute $id\_$ is used to keep track of vehicles.

The type of the instance attribute is string.

> **Correct Solution:**
>
> The instance attribute *self._vehicles* is used to keep track of vehicles.

> The type of the instance attribute is 'dictionary'.

b. The vehicles are initialized in class *SuperDuperManager*'s *add_vehicle* method.

> **Correct Solution:**
>
> The instance attribute is initialized in class *SuperDuperManager*'s *__init__* method.

c. In code that keeps track of all the vehicles, the vehicles are updated via the methods *add_vehicle* and *move_vehicle*

Question 5

a. If left as is, every car object would possess the instance attributes *self.position* and *self.fuel* from class Vehicle.

b. No. Other instance attributes are not necessary. The instance attribute *position* can be used to define its initial position, and position after move. As well, the attribute *self.fuel* can be used to calculate the amount of distance

Notes:

- 여보, 형모 노래 듣고 있었어요
- https://www.youtube.com/watch?v=5jl8mzCaCr0
- 여보, 형모 내 여보 많이 보고싶어요
- 구래두 여보, 형모 내 여보 보러 꾹 참꾸 걸어요
- 여보, 사랑해
- 여보, 고마워요 :)

Question 6

Question 7

Question 8