Programing Assignment 1

I. Part1 – Designing Classes Using Python (40 pts)

Description

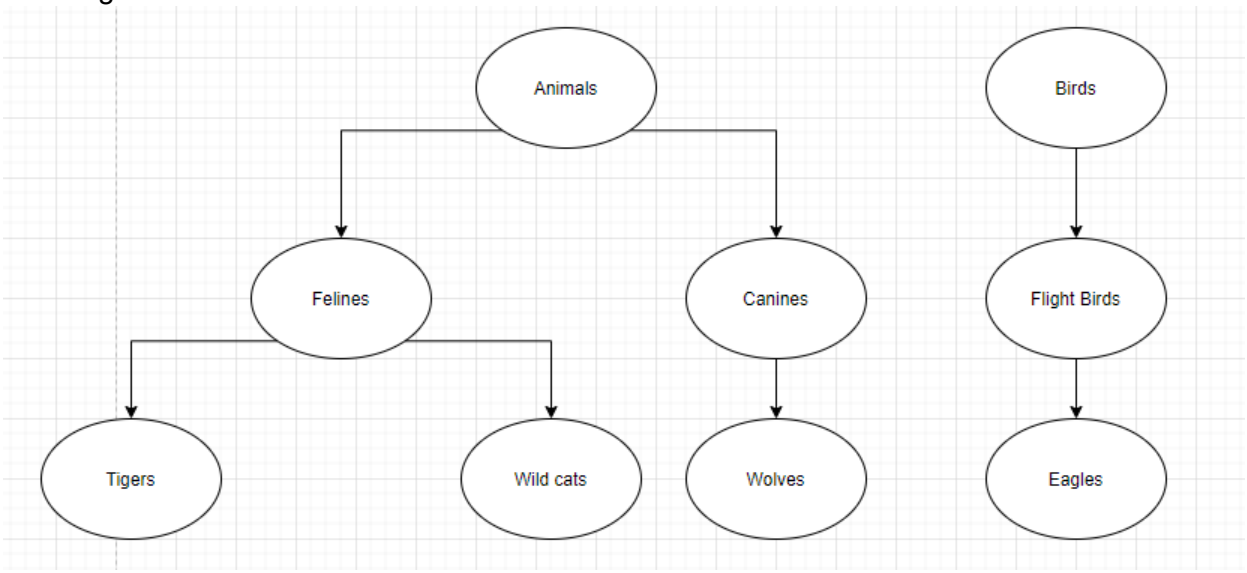
For this part, your goal is to apply various concepts for designing classes and creating proper parent child relationships to simulate real world scenarios.

This part is designed to measure and assess your ability to:

- Apply object-oriented programming techniques.
- Use the concept of inheritance.
- Produce quality code, including the way entities are modelled and how modelling represents the real world effectively. You will also be graded on how much code reuse is facilitated by your design.

Instructions

For this assignment, you will create an ecosystem that represents a zoo. The zoo will have a variety of animals and birds. These animals and birds can be organized as shown in the following chart.



Each of these animal groups have some special characteristics that get passed on to the child. The child along with the characteristics derived from the parent will also have their own characteristics. This zoo can save a fixed number of animals and birds and is open to see the animals in them.

Design and represent the animals and birds in the above diagram as classes in python. Design a zoo class to house these animals and birds. These classes should obey the requirements below.

Requirements:

1. Each animal has some common features like the number of hands and legs.
    a. Felines and canines have 4 legs and no hands.
2. Each bird has a number of legs and number of wings as a feature.
    a. Flight birds have 2 legs and 2 wings.
3. Represent these features as attributes.
4. The characteristic for each of the animals are as follows:

    a. Felines belong to the cat family.
    b. Canines belong to the dog family.
    c. Tigers can roar and are lethal predators.
    d. Wild cats can climb trees.
    e. Wolves hunt in packs and have a leader.
    f. Flight birds fly and hunt for food.
    g. Eagles fly extremely high and can see their prey from high up in the sky.
5. Add the characteristics of animals and birds to their respective classes.
6. Create a zoo that can have 2 animals and 1 bird.
7. Zoo should be able to add only an animal or a bird if it is not full.
8. Zoo should be able to provide a way to look at all the animals/birds it has.
9. Looking at animals/birds means you should be able to get all the features and characteristics of them.

II. Part 2 – Lambdas, Map, filter and reduce (40pts)

Description

This part is designed to measure and assess your ability to:

- Design and use simple regular expressions.
- Create and use lambdas and higher order functions.

This part of the project builds upon the program you wrote for Part1 – Designing Classes Using Python. We will use the zoo and all the classes of animals and birds we previously created. Below is the organizational chart for the classes we created in the previous assignment.
We will provide additional functionality to the zoo class in this part and amend the existing classes.

Instructions

Amend the classes to include the following functionality.

1. Modify the method to add animals or bids to the zoo.
    a. Using filter function, add functionality to ensure that only one object of each animal class can be added to the zoo. For example, zoo can have only one tiger. If we try to add more, print a message stating, animal already added.
2. Amend your looking method to use map and reduce function and create a single string to represent the zoo.
3. Add one method to look at all the canines in the zoo, use a filter function with lambdas for it.
4. Add a method to filter out tiger in the zoo and look at them. Use regex to achieve this functionality.
5. Hint: you will have to go over all the animals in the zoo.

III. Send the code for Part 1 and Part2 in a zip folder.

IV. Demo (20pts)