CA 3: Experiential Learning

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Problem Statement:

To create a C++ program for an Animal Information System that allows users to choose a particular animal from a given list and learn the basics of it like their diet and the region they are usually found in.

Explanation:

This is a menu-driven code that allows the user to select any animal and get its details, this program contains the following details:

1. Name
2. Place in the Animal Kingdom
3. Type of Blood
4. Diet
5. Places usually found in

This code was written with the help of multilevel inheritance and polymorphism.

Polymorphism is used in 2 ways:

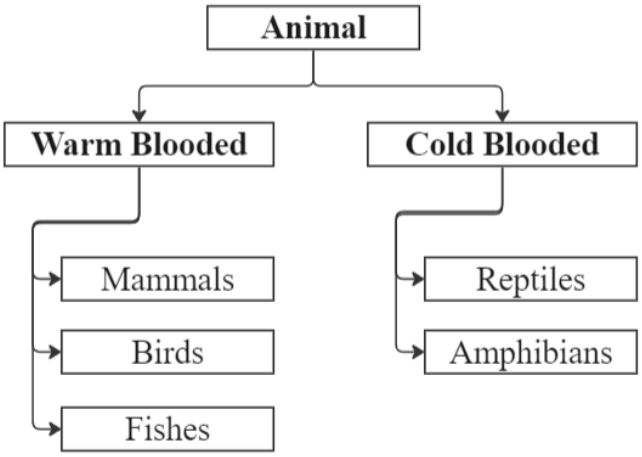
1. Array of Animal Pointers:
   In your code, you create an array of pointers to Animal objects: Animal* animals[max_animals]. These pointers can point to objects of the base class and any of its derived classes. For example, you can point an Animal* pointer to a Mammal object.

2. Polymorphic Behavior:
   In the main() function, you display a list of animal names, and then take user input to choose an animal. When you call animals[choice-1]->put_data();, polymorphism comes into play

3. Derived Classes:
   You have several derived classes that inherit from the Animal class, such as Mammal, Bird, Fish, Reptiles, and Amphibians. These derived classes override the put_data() function.

Inheritance is used as shown in the diagram below.

Class Diagram:



Code snippets:

```
class Animal {
    public:
        string name, blood, kingdom, food, sounds, reg;

        Animal(string name, string blood, string kingdom, string food, string sounds, string reg)
            : name(name), blood(blood), kingdom(kingdom), food(food), sounds(sounds), reg(reg) {
        }

        void put_data() {
            cout.setf(ios::left, ios::adjustfield); cout.width(20);
            cout<<endl<<"Animal Name "<<"-> "<<name<<endl;
            cout.setf(ios::left, ios::adjustfield); cout.width(20);
            cout<<"Blood Temperature "<<"-> "<<blood<<endl;
            cout.setf(ios::left, ios::adjustfield); cout.width(20);
            cout<<"Kingdom "<<"-> "<<kingdom<<endl;
            cout.setf(ios::left, ios::adjustfield); cout.width(20);
            cout<<"Diet "<<"-> "<<food<<endl;
            cout.setf(ios::left, ios::adjustfield); cout.width(20);
            cout<<"Sound: "<<"-> "<<sounds<<endl;
            cout.setf(ios::left, ios::adjustfield); cout.width(20);
            cout<<"Commonly Found In "<<"-> "<<reg<<endl;


        }
};
```

```
class ColdBlood : public Animal {
    public:
        ColdBlood(string name, string kingdom, string food, string reg, string sounds)
        : Animal(name, "Cold Blooded", kingdom, food, reg, sounds){
        }
};

class Mammal : public WarmBlood {
    public:
        Mammal(string name, string food, string reg, string sounds)
        : WarmBlood(name, "Mammal", food, reg, sounds){
        }

};

class Bird : public WarmBlood {
    public:
        Bird(string name, string food, string reg, string sounds)
        : WarmBlood(name, "Bird", food, reg, sounds){
        }
};
```

```cpp
int main(){
    data_mammal();
    data_bird();
    data_fish();
    data_reptile();
    data_amphibians();

    int choice;
    do{
        for(int i=0;i<max_animals;i++){
            cout<<i+1<<". ";
            cout.setf(ios::left, ios::adjustfield);
            cout.width(28);
            cout<<animals[i]->name;
            if((i+1)%5==0){
                cout<<endl;
            }
            if((i+1)%10==0){
                cout<<endl;
            }
        }

        cout<<endl<<"\nEnter Choice (1-50 for Animals Mentioned and 0 to Exit): ";
        cin>>choice;
        if(choice>=1 && choice<=max_animals){
            animals[choice-1]->put_data();
            cout<<endl;
        }
        else if(choice!=0){
            cout<<"Invalid Option, Choose again"<<endl;
        }
    }while(choice!=0);
}
```

Input/Output:

```
1. Giraffe                  2. Elephant                 3. Humpback Whale           4. Kangaroo                 5. Killer Whale
6. Lion                     7. Orangutan                8. Panda                    9. Polar Bear               10. Red Fox

11. American Robin          12. Australian Kookaburra   13. Bald Eagle              14. Common Loon             15. Common Nightingale
16. European Swallow        17. Indian Peafowl          18. Ostrich                 19. Peregrine Falcon        20. Toucan

21. Angelfish               22. Barracuda               23. Catfish                 24. Clownfish               25. Mackerel
26. Piranha                 27. Salmon                  28. Swordfish               29. Tuna                    30. Trout

31. American Alligator      32. Anole Lizard            33. Boa Constrictor         34. Chameleon               35. Galapagos Tortoise
36. Gila Monster            37. Green Iguana            38. King Cobra              39. Komodo Dragon           40. Nile Crocodile

41. African Clawed Frog     42. American Bullfrog       43. European Common         44. Fire-bellied Toad       45. Green Tree Frog
46. Japanese Giant Salamander 47. Moor Frog             48. Red-eyed Tree Frog      49. Spotted Salamander      50. Yellow-eyed Tree Frog


Enter Choice (1-50 for Animals Mentioned and 0 to Exit): 23

Animal Name         -> Catfish
Blood Temperature   -> Warm Blooded
Kingdom             -> Fish
Diet                -> Omnivorous, consuming a variety of aquatic creatures
Sound:              -> Catfish communicate using vocalizations or body vibrations
Commonly Found In   -> Found in freshwater habitats worldwide

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Enter Choice (1-50 for Animals Mentioned and 0 to Exit): 0
```

Github repository link:

https://github.com/Atharva-Gondhali/Animal-Hierarchy