CS 542 HW Assignment 1 (Due by 12pm on Feb 8th)

Virtual Function and Interface in C++ (30 points)

Note: You must have already studied the examples in

InheritedFunction

VirtualFunction

VirtualFuncWithArrays

InterfaceClass

1. **Usefulness of Virtual Functions: (15 points)**
    Create a hierarchy where Animal is the base and directly derived classes are Dog and Cat.

    Animal class:
    *   **Make Animal an abstract class with a <u>virtual function</u> called Speak.**
    *   **Speak should cout "Speaking"**
    *   **In the Animal class, there should be one <u>non-virtual function</u> called Jump**
    *   **Jump should cout "Jumping"**
    Derived classes:
    *   **Define Speak in derived classes. Speak will cout "Bow wow" or "Meow" in derived classes.**
    *   **Define Jump in derived classes. Jump will cout "dog boing" or"cat boing" in derived classes.**
    For all classes:
    *   **No data members are needed.**
    *   **The constructors of these classes should display "creating *name-of-the-class*".**
    *   **The destructors of these classes should display "destroying *name-of-the-class.*"**
    In the client
    *   **Create a small static array of Animal <u>pointers</u> and assign them to a new dog, a new cat and a new dog in this order.**
    *   **Then, call Speak and Jump on each by iterating through the array using a for loop: for(int i= ;, i<3; i++)**

    <mark>**Compile and run on Empress.**</mark>

2. **Usefulness of Interface classes: (15 points)**
    Make a copy of the Animal class and call it Ianimal (an Interface class).
    Make Speak a <u>pure virtual</u> function.
    Remove the non-virtual function Jump.
    Remove the constructor and destructor since an Ianimal object would not be created.
    Ianimal.cpp is not needed.

    Create a hierarchy where Ianimal is the base and directly derived classes are Dog and Cat.
    *   **Remove calls to Jump from the client.**

    <mark>**Compile and run on Empress.**</mark>

Submission

SUBMIT ALL THE FILES IN A ZIP FILE TO COUGAR COURSES:

Always make sure the files you submit can be compiled on empress.csusm.edu.

• Program1: Submit the contents of the 3 header files, 3 implementation files, one client file and the results (output) as one big Word file, please.

• Program2: Submit the content of the Ianimal header file and just the results as one big Word file, please.

Note: Compress all the above files in a zip file, name it with your name, and submit the zip file on Cougar Course. For example, my first name is Xin and my last name is Ye, then I will name the zip file as XinYe.zip.

Grading

1. On Cougar Course, submit all the files in a zip file with your name. Otherwise, we will not grade it.
2. Your code should be compiled on Cougar Course. If there is a compilation error, you will get 0 points.
3. If your code fails in 1 test case, we will deduct 10% of the total points.
4. If your code fails in 2 test cases, we will deduct 20% of the total points.
5. If your code fails in 3 test cases, we will deduct 40% of the total points.
6. If your code fails in more than 3 test cases, we will deduct 90% of the total points.
7. The comments in your code count for 10% of the total points.
8. Additionally, we will deduct 5 points for each day after the due date.