## Lab Purpose

For this program, you will use C++ inheritance to create a base class and a derived class. You will also be working with constructors and redefining class member functions.

## Always bring to class

1. Gaddis' book, How-to handouts from Canvas and your class notes.
2. This assignment sheet & the grade sheet for this lab already printed out.
3. USB Flash drive(s) or other storage media.

## Mandatory Instructions

1. The base class *Dog* is a class with general information about dogs. Store the declaration for this class in a file called **lab8dog.h**. The class has three *protect*ed data members to store dog's *name*, *color* and *weight*. Include a prototype for a default constructor that sets the *name* and *color* to the value "*Unknown*" and the *weight* to 0.0. Include a second prototype for a constructor that accepts values for the dog's *name*, *color* and *weight* and assigns them to the data members. Also, include a prototype for a function called **displayDog** to display the values of each data member.

2. Implement all member functions for the *Dog* class in the file called **lab8dog.cpp**.

3. Class *ShowDog* will be a derived class with additional information about dogs who have been entered in dog shows – so a *ShowDog* "is a" *Dog* which means it will inherit from the *Dog* base class. Store the declaration for the *ShowDog* class in the file **lab8show.h** and define the functions in the file **lab8show.cpp**.

   - This class has two *private* data members – the number of contests a dog has been entered in and the number of contests it has won.

   - Define a default constructor that sets these two fields to zero and invokes the *Dog* default constructor to initialize the inherited data members.

   - Define a second constructor that accepts a dog's *name*, *color*, *weight*, *number of contests entered* and *number won*. Pass the first three arguments to the *Dog* constructor and use the last two to set the *ShowDog's* data members.

   - Include a prototype for a function called **displayDog**. It should first call the base class version of the function (to display the dog's *name*, *color* and *weight*) and then display the *number of contests entered* by the dog and the *number won*. This function is redefining the base class version of **displayDog**. The function should produce an output like this:

```
Dog's name:  Toto              (first three lines are printed by base class displayDog function)
Dog's weight: 25
Dog's color:  Grey
Toto was entered in 5 contests,
Toto won 2 of the contests.
```

4. Write a client program called **lab8client.cpp** to demonstrate the use of *Dog* and *ShowDog* classes.

   - Define a *Dog* object initializing the *name*, *color* and *weight* with "Bolt", "White" and 20.

   - Define a *ShowDog* object with arguments for all five data members using the values "Uggie", "Blk/Wht", 30, 3, 1.

- Call the **displayDog** function to display the information about each of these objects.

## Optional Instructions

In your *main* function, define an array with four elements to hold pointers to objects of type *Dog*.

Dynamically allocate either a *Dog* or a *ShowDog* object, storing the pointer to the object (an address) in the next element of the array.

Use the dog data from the table shown below to create and initialize each new object in your program:

```
dogList[0] = new Dog("Bingo", 20, "Tan");
```

| Name | Weight | Color | #contests | #won |
|---|---|---|---|---|
| Bingo | 20 | Tan | | |
| Beethoven | 200 | Brown | 3 | 1 |
| Marley | 80 | Yellow | 10 | 3 |
| Fido | 50 | Rust | | |

Then write a loop to display (i.e., call the displayDog() method) the data for each object in the array.

**Tip**: In the header file for the *Dog* class, make your **displayDog** function **`virtual`**. Also, add an inlined **`virtual`** destructor to the Dog class: `virtual ~Dog(){}` (This prevents a warning message from the compiler.)

Example output:

```
Dog's name:   Bolt
Dog's color:  White
Dog's weight: 20.00

Dog's name:   Uggie
Dog's color:  Blk/Wht
Dog's weight: 30.00
Uggie was entered in 3 contess,
Uggie won 1 of the contests.

Dog's name:   Bingo
Dog's color:  Tan
Dog's weight: 20.00

Dog's name:   Beethoven
Dog's color:  Brown
Dog's weight: 200.00
Beethoven was entered in 3 contess,
Beethoven won 1 of the contests.

Dog's name:   Marley
Dog's color:  Yellow
Dog's weight: 80.00
Marley was entered in 10 contess,
Marley won 3 of the contests.

Dog's name:   Fido
Dog's color:  Rust
Dog's weight: 50.00

Press any key to continue . . .
```

## What to turn in?

**Make a printout of your program to turn in by typing the following commands at the prompt:**

```
$  photo lab8.log                                        ( to start the photo utility )
$  ls  -l                                                ( to list all files in your directory )
$  cat lab8dog.h                                         ( to show your C++ source code )
$  cat lab8dog.cpp
$  cat lab8show.h
$  cat lab8show.cpp
$  cat lab8client.cpp
$  g++  lab8client.cpp   lab8dog.cpp   lab8show.cpp     ( to compile your program )
$  .\a.out                                               ( to run your program )
$  Ctrl-d                                                ( to end the photo session )
$  logout
```