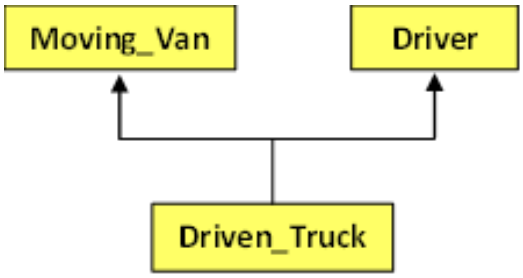
14 - Programming Exercises
Vehicle Inheritance

Program the following task in your C++ compiler. Keep compiling and executing even after writing a single line of code.

Vehicle Inheritance

Implement the following class hierarchy using public inheritance for the **Driven_Truck** class:



ADT: Moving_Van

- **Protected Data Members**:
  - **payload**: A float representing the payload weight.
  - **mpg**: A float representing the miles per gallon.
- **Member Functions**:
  - **initialize(float payload, float mpg)**: Initializes the data members with the provided arguments.
  - **efficiency()**: Calculates and returns the efficiency of the **Moving_Van** object using the formula:

$$efficiency = payload \,/\, (payload + weight)$$

  - **cost_per_ton(float fuel_cost)**: Calculates and returns the cost per ton using the formula:

$$cost\_per\_ton = fuel\_cost \,/\, (payload \,/\, 2000.0)$$

ADT: Driver

- **Protected Data Members**:
  - **hourly_pay:** A float representing the hourly pay of the driver.
  - **weight:** A float representing the weight of the driver.
- **Member Functions**:
  - **initialize(float hourly_pay, float weight):** Initializes the data members with the provided arguments.
  - **cost_per_mile():** Calculates and returns the cost per mile using the formula:

$$cost\_per\_mile = hourly\_pay \,/\, 55.0$$

  - **drivers_weight():** Returns the weight of the driver.

ADT: Driven_Truck (Inheriting from Moving_Van and Driver)

- **Member Functions**:
  - **initialize(float payload, float mpg, float hourly_pay, float weight):** Initializes all the data members inherited from the base classes with the provided arguments. Do not call the **initialize** methods of the base classes.
  - **cost_per_full_day(float cost_of_gas):** Calculates and returns the cost per full day using the formula

$$cost\_per\_full\_day = (8.0 * hourly\_pay + 8.0 * cost\_of\_gas * 55.0) \,/\, mpg$$

  - **total_weight()**: Calculates and returns the total weight by adding the weight of the **Moving_Van** and the **Driver**.

Main Method Instructions

1. Create an object named **chuck_ford** of the **Driven_Truck** class.
2. Initialize the **chuck_ford** object using the **initialize** method of the **Driven_Truck** class.
3. Initialize the **Driver** part of the **chuck_ford** object using the **initialize** method of the **Driver** class.
4. Calculate and display the efficiency of the **chuck_ford** object.
5. Calculate and display the cost per mile of the **chuck_ford** object.
6. Calculate and display the cost per full day of the **chuck_ford** object.
7. Calculate and display the total weight of the **chuck_ford** object

Additional Requirements

- Add default constructors, parameterized constructors, and copy constructors for each class.
- Test and observe the constructor call sequences by creating different objects using the default, parameterized, and copy constructors.

☺ ☺ ☺ **Quality is not an act; it is a habit.** ☺ ☺ ☺
