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**Final Project Plan**

**Abstraction**

Video

Title, author, and length of video (\_seconds).

Method

Number of comments (\_videos).

**Encapsulation**

Order

* Contains a list of products and a customer. Can calculate the total cost of the order, and can return a string for the packing label, and can return a string for the shipping label.
* The total price is calculated as the sum of the prices of each product plus a one-time shipping cost.
* This company is based in the USA. If the customer lives in the USA, then the shipping cost is $5. If the customer does not live in the USA, then the shipping cost is $35.
* A packing label should list the name and product id of each product in the order.
* A shipping label should list the name and address of the customer

Product

* Contains the name, product id, price, and quantity of each product.
* The price of this product is computed by multiplying the price and the quantity.

Customer

* The customer contains a name and an address.
* The name is a string, but the Address is a class.
* The customer should have a method that can return whether they live in the USA or not. (Hint this should call a method on the address to find this).

Address

* The address contains a string for the street address, the city, state/province, and country.
* The address should have a method that can return whether it is in the USA or not.
* The address should have a method to return a string all of its fields together in one string (with newline characters where appropriate).

Other Options

Make sure that all member variables are private and getters, setters, and constructors are created as needed. Once you have created these classes, write a program that creates at least two orders with 2-3 products each. Call the methods to get the packing label, the shipping label, and the total price of the order, and display the results of these methods.

**Inheritance**

Event

* Lectures, which have a speaker and have a limited capacity.
* Receptions, which require people to RSVP, or register, beforehand.
* Outdoor gatherings, which do not have a limit on attendees, but need to track the weather forecast.

Program

* Standard details - Lists the title, description, date, time, and address.
* Full details - Lists all of the above, plus type of event and information specific to that event type. For lectures, this includes the speaker name and capacity. For receptions this includes an email for RSVP. For outdoor gatherings, this includes a statement of the weather.
* Short description - Lists the type of event, title, and the date.

In addition, your program must:

1. Use inheritance to avoid duplicating shared attributes and methods.
2. Use an address class for the addresses.
3. Follow the principles of encapsulation, making sure each member variable is private.

**Polymorphism**

Running

Distance (\_distance).

Cycling

Speed (\_speed).

Swimming

Number of laps (\_laps).

For each activity, they do not want to store this information, but they would like to be able to get following information (by calculation if it is not stored directly):

* The distance
* The speed (miles per hour or kilometers per hour)
* The pace (minutes per mile or minutes per kilometer)
* A summary in the form of:
  + 03 Nov 2022 Running (30 min)- Distance 3.0 miles, Speed 6.0 mph, Pace: 10.0 min per mile
  + 03 Nov 2022 Running (30 min): Distance 4.8 km, Speed: 9.7 kph, Pace: 6.9 min per km
  + Lap pool length = 50 meters (m).
  + I’m going to do my calculations in miles.

Write a program that has a base Activity class and then has a derived class for each of the three activities. The base class should contain any attributes that are shared among all activities. Then, each derived class can define any additional attributes.

In addition, the base class should contain virtual methods for getting the distance, speed, pace. These methods should be overridden in the derived classes.

Finally, you should provide a GetSummary method to produce a string with all the summary information. Remember that the summary method can make use of the other methods to produce its result. This method should be available for all classes, so it should be defined in the base class (you can override it in the derived classes if needed, but it may not need to be...).

Once you have the classes in place, write a program that creates at least one activity of each type. Put each of these activities **in the same list**. Then iterate through this list and call the GetSummary method on each item and display the results.

In addition, your program must:

1. Use inheritance to avoid duplicating shared attributes and methods.
2. Use method overriding for the calculation methods.
3. Follow the principles of encapsulation, making sure each member variable is private.

##### Math Hints:

* Distance (km) = swimming laps \* 50 / 1000
* Distance (miles) = swimming laps \* 50 / 1000 \* 0.62
* Speed (mph or kph) = (distance / minutes) \* 60
* Pace (min per mile or min per km) = minutes / distance
* Speed = 60 / pace
* Pace = 60 / speed

This is my Design. I directly copied and pasted a majority of the instructions, but that’s because I wanted to be able to understand the concept and process of how the final program needs to look and how it’s supposed to function.

**Abstraction**

For the Abstraction assignment, I’m going to track YouTube videos about the US Army Surplus Alice pack. It’s a frame pack that was designed and used during the Vietnam War and it has withstood the test of time. Many outdoor preppers use them as well as hunters. The community that use them in today’s world will take the pack with the current generation of military frame pack straps and modify the Alice packs to what is either referred to as the Malice Pack (Modified Alice Pack), and it’s also called the Alice Hellcat hybrid pack.

**Encapsulation**

With my interest in the Surplus Alice packs, I think that I would like to write this in such a way that I am ordering surplus packs and equipment that can help people upgrade and modify the Alice pack.

**Inheritance**

I think the type of event that I would like to plan for is some type of outdoor camping or fishing expose. This would take in my love of the outdoors and the state of Utah that I live in. There are plenty of opportunities that would be of the global scale that can easily be set here in Utah.

**Polymorphism**  
 It would be great to facilitate and outdoor training opportunity that would provide exercise and fitness to the many that would like to experience the world that we live in and take in everything that Utah has to offer.