

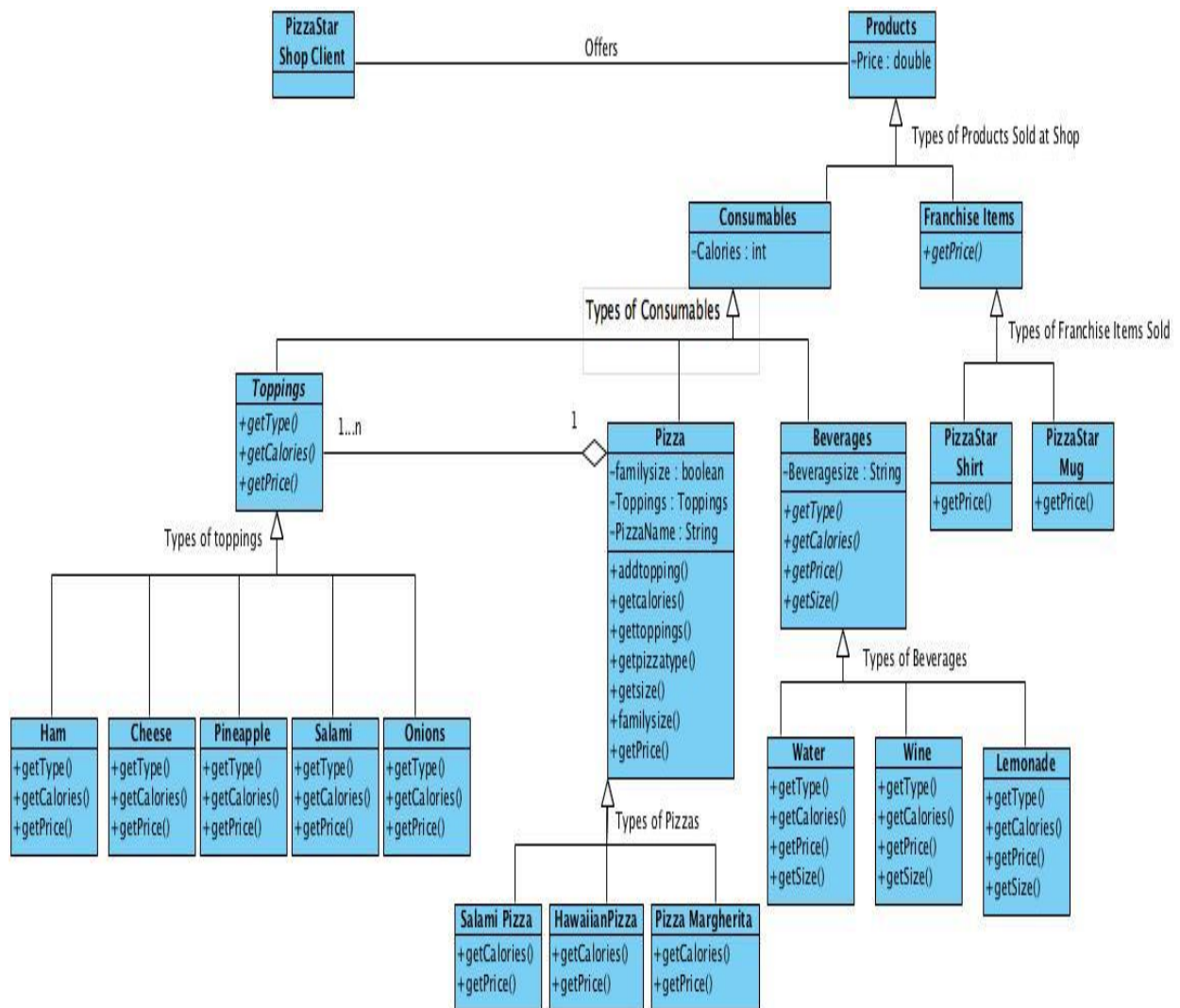
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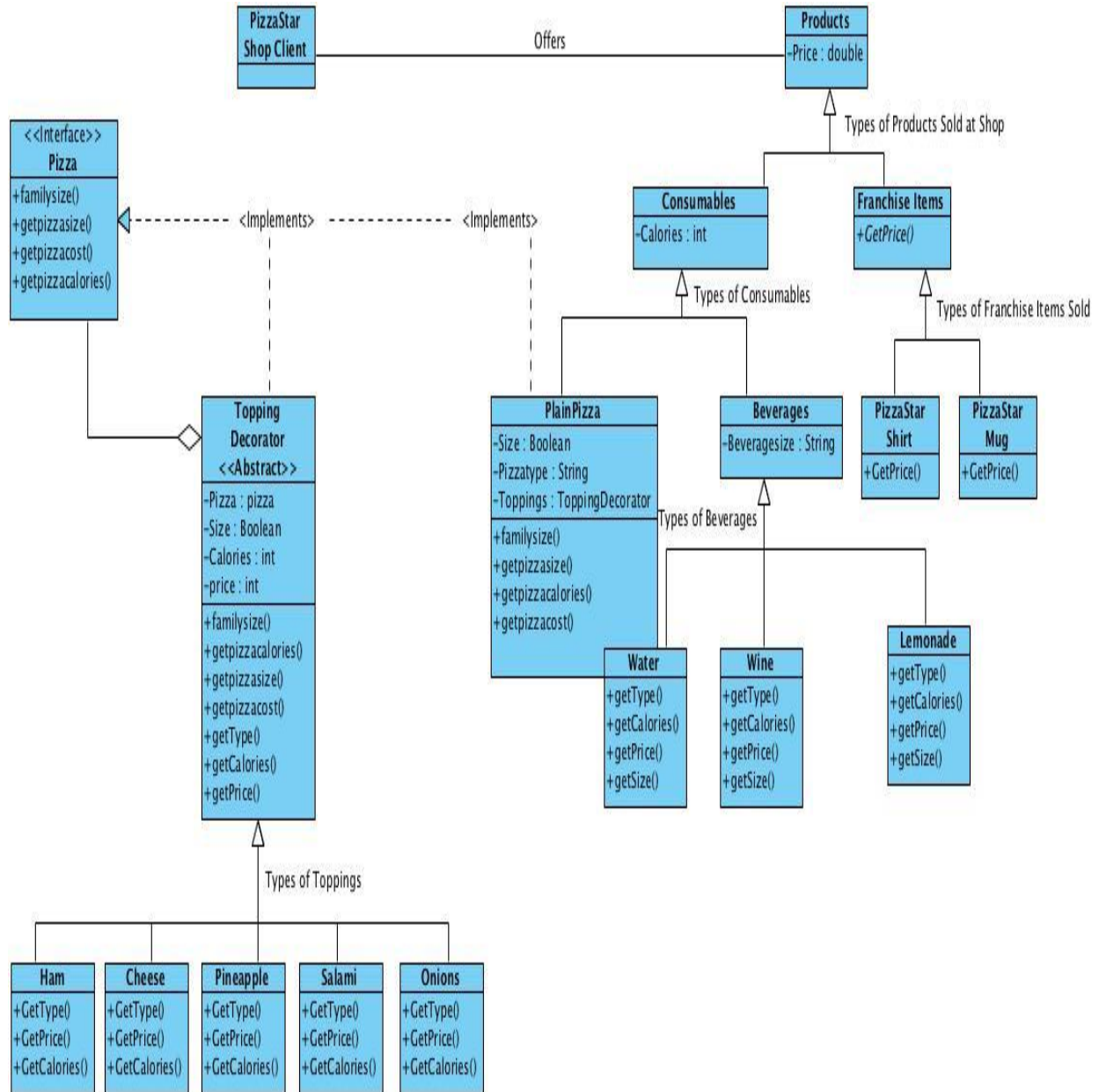
Software Engineering

### Software Engineering Homework 3

Task 1 Class Diagram:



## Task 2 Class Diagram:



### Task 3 Question Answers:

1. The main difference between the two solutions is in the implementation of adding pizzas with toppings. In the first solution, toppings to pizzas were added as attributes. This creates issues as it is very difficult to achieve if there were to be a large number of toppings that would need to be added to each pizza. In comparison, the decorator design pattern allows one to add multiple toppings without having to adjust the pizza object itself. By starting off with a base concrete pizza class in the decorator design pattern and by using interfaces to implement the toppings, the adding of additional toppings becomes much easier.
2. In this case, the abstract factory design pattern can be used to create the individual toppings. You would create topping factories that would leave the implementation and creation of the toppings down to the topping factories themselves. You can then recombine these individual toppings that are made into a full pizza. However, in this case, it would make more sense to use the decorator design pattern as fundamentally, the factory design pattern deals with object creation. If there happened to be a situation wherein the functionality of the toppings needed to be extended, then both can be used in conjunction with each other. However, in this case, as you only want to extend the functionality of the base pizza (by adding additional toppings to it) and it is not solid pre-determined pizzas that are being formed, the decorator pattern fits the situation better.
3. Here, the prototype design pattern can be used to create a better system. To begin, the prototype pattern can be used to potentially create more complex pizzas rather than constructing them from the very base class. For instance, if a customer knows that they wanted a Hawaiian pizza but also wanted additional toppings on top of the Hawaiian pizza, the prototype pattern can be used to save resources.