Aggregation

In this lesson, you'll get familiar with a new way of linking different classes.

WE'LL COVER THE FOLLOWING

Aggregation is a specialized form of *association*. It follows the **Has-A** model. In aggregation, a class **uses** the objects of other classes. Here, we will refer to the class, **using** the objects of other classes, as the *container* class, and the classes whose objects are being used as the *contained* classes.

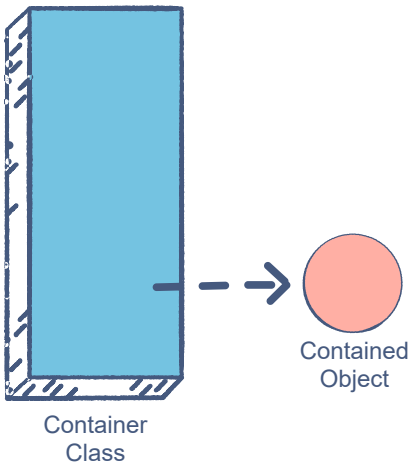
The *container* class contains the references to the objects of the *contained* classes.

Let’s see what makes aggregation unique.

Independent Lifetimes

> In aggregation, the lifetime of the contained object does not depend on the lifetime of the container object.

The *container* object could get deleted but the *contained* object can continue to exist in the program. The container only contains a **reference** to the contained, which removes the latter’s dependence on the former.



The container simply references to the contained object

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You can probably guess from the illustration above that we'll need object references to implement aggregation.

Example

Let's take the example of the vending machine and the products inside it. A vending machine contains products but these products will still exist even if the vending machine ceases to exist. Let's assume, just for ease of our understanding, we have a vending machine with a capacity of 5 products and it's our duty to refill this machine daily. We are going to place the products in the machine with the help of an `InsertProduct()` method. Let's see this in our code:

```
class VendingMachine
{

    private Product[] _productShelf;
    private int _capacity;
    private static int _productCount;


    public VendingMachine()
    {
        this._productShelf = new Product[5];
        this._capacity = 5;
        _productCount = 0;
    }
    public bool InsertProduct(Product item)
    {
        if (_productCount < _capacity)
        {
```

```
            {
                this._productShelf[_productCount] = item;
                _productCount++;
                return true;
            }
            else
            {
                return false;
            }
        }

        public void PrintProducts()
        {
            for (int i = 0; i < this._capacity; i++)
            {
                _productShelf[i].PrintDetails();
            }
        }

    }

    public class Product
    {

        private string _name;
        private double _price;

        public Product(string name, double price)
        {
            this._name = name;
            this._price = price;
        }

        public void PrintDetails()
        {
            Console.Write("[{0}  {1}]\t\t", this._name, this._price);
        }

    }

    class Demo
    {

        public static void Main(string[] args)
        {
            // Creating Vending Machine
            VendingMachine myVendy = new VendingMachine();
            // Creating Products
            Product snack = new Product("Rango Tango", 0.5);
            Product drink = new Product("Mineral Water", 0.7);
            Product chocolate = new Product("Crunchy", 1);
            Product energyDrink = new Product("Red Bull", 3);
            Product popcorn = new Product("Caramel pop", 0.5);
            // Inserting Products into machine
            myVendy.InsertProduct(snack);
            myVendy.InsertProduct(drink);
            myVendy.InsertProduct(chocolate);
            myVendy.InsertProduct(energyDrink);
            myVendy.InsertProduct(popcorn);
            // Printing the product in vending machine
            myVendy.PrintProducts();
            // Now if we null the myVend
            myVendy = null;
```

```
        // The products still exist and are still usable
        Console.WriteLine("\nThe Products still exist!");
        snack.PrintDetails();

        drink.PrintDetails();
        chocolate.PrintDetails();
        energyDrink.PrintDetails();
        popcorn.PrintDetails();
    }

}
```

Products can exist independently even if the vending machine ceases to exist

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As we can see on **lines 83-87**, the `Product` objects live on even after the `VendingMachine` is set to `null` on **line 80**. This creates a looser relationship between the two.

In the next lesson, we will explore the third type of linkage between classes, i.e. composition.