1. Abstraction

Definition: Abstraction is the concept of hiding the complex implementation details of a system and exposing only the essential features to the user. It allows programmers to focus on what an object does rather than how it does it.

Example: In a program simulating a zoo, an **Animal** class might have methods like **AnimalSound()** and **AnimalSpecies()**. Users of the class do not need to know the internal workings of these methods; they only need to know that animal have different sounds and species.

Relation to Programs: In our assignments, referring to Iteration 4, abstraction was used when the **Execute** method of **LookCommand** abstracts the process of parsing the command and determining whether to look at an item directly or within a container. It hides the detailed logic of how to perform these actions from the user.

2. Encapsulation

Definition: Encapsulation is the bundling of data and methods that operate on the data within a single unit or class, and restricting access to some of the object's components. This is done to protect the internal state of the object from unintended interference and misuse.

Example: In the **Animal** class, the **_food** might be a private field, meaning it cannot be accessed directly from outside the class. Instead, methods like **nutrition_source()** are provided to interact with the object's data safely.

Relation to Programs: Encapsulation was applied in our projects by defining classes with private fields and public getter and setter methods. For example, the **GameObject** class with private fields **_name** and **_description**, accessed through **Name()** and **FullDescription()** methods.

3. Inheritance

Definition: Inheritance is a mechanism where a new class inherits properties and behaviors (methods) from an existing class. This allows for code reusability and the creation of a hierarchical relationship between classes.

Example: If we have an **Animal** class, we could create a **Cat** class that inherits from **Animal**. The **Cat** class would have all the attributes and methods of **Animal** such as leg number or with fur, plus any additional attributes or methods specific to a cat.

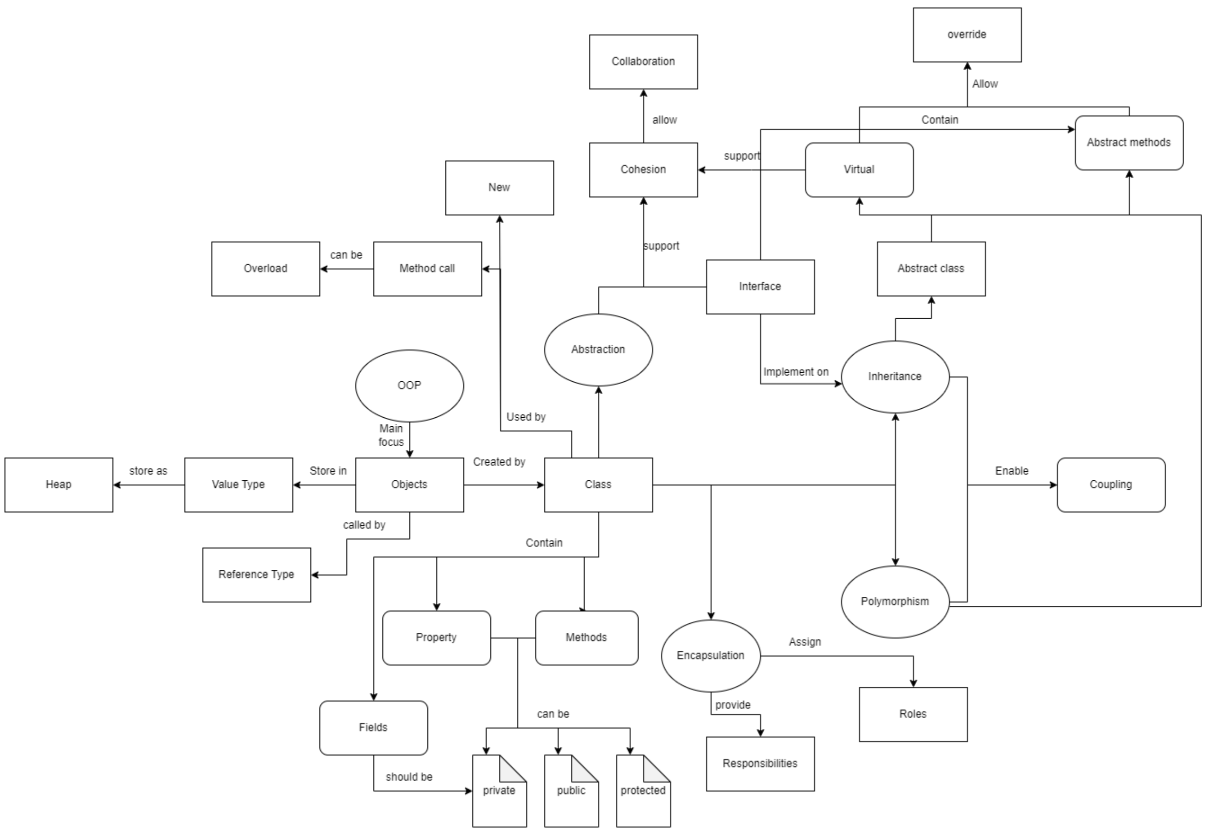
Relation to Programs: In our assignments, inheritance was used to create specialized classes from general ones, such as a **Bag** class inheriting from a **Item** class, adding new attributes like **Iventory**.

4. Polymorphism

Definition: Polymorphism allows objects of different classes to be treated as objects of a common super class. It is the ability to redefine methods in derived classes, and it supports method overriding and method overloading.

Example: If Animal is a superclass with a method **makeSound()**, and Dog and Cat are subclasses, both can override **makeSound()** to provide their specific implementations. A function that takes an **Animal** object can thus accept both Dog and Cat objects.

Relation to Programs: Polymorphism was utilized in our projects when we had methods in interfaces or base classes that were implemented differently in derived classes. For instance, an interface **IHaveInventory** with a method **Locate()**, implemented by **Bag** and **Player** classes.



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