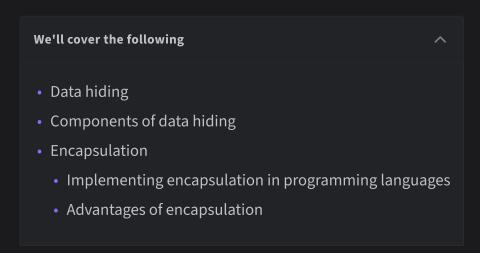
#### **Encapsulation**

Get familiar with important aspects of object-oriented programming called data hiding and encapsulation.



### **Data hiding**

Data hiding is an essential concept in object-oriented programming. In simple terms, it can be defined as masking a class's internal operations and only providing an interface through which other entities can interact with the class without being aware of what is happening within.

The goal is to implement classes in a way that prevents unauthorized access to or modification of the original contents of a class by its instances (or objects). The underlying algorithms of one class need not be known to another class. The two classes can still communicate, though.

# Components of data hiding

Data hiding can be divided into two primary components:

- Encapsulation
- Abstraction

When used together, they allow us to make efficient classes for further use in our application.

## **Encapsulation**

Encapsulation is a fundamental programming technique used to achieve data hiding in OOP. Encapsulation in OOP refers to binding data and the methods to manipulate that data together in a single unit—class.

can be thought of as a capsule with methods and attributes inside it.

Encapsulation is usually done to hide the state and representation of an object from the outside. A class

When encapsulating classes, a good convention is to declare all variables of a class private. This will restrict direct access by the code outside that class.

At this point, a question can be raised. If the methods and variables are encapsulated in a class, how can they be used outside that class? The answer to this is simple. One has to implement public methods to let the outside world communicate with this class. These methods are called **getters** and **setters**. We can also implement other custom methods.

Implementing encapsulation in programming languages

In this section, we will show how to implement encapsulation using some of the most popular objectoriented programming languages, such as Java, C#, Python, C++, and JavaScript.

For the sake of explanation, we'll start off by creating a simple Movie class, which contains the following three data members (attributes):

- title
- year
- genre

itself. Let's try it out.

4

2 // Data members 3 private String title;

1 class Movie {

information. The question is, how do we access or modify them?

Below is the implementation of the Movie class in different OOP languages.

```
// Data members
     private String title;
     private int year;
4
     private String genre;
     // Default constructor
     public Movie() {
10
      year = -1;
       genre = "";
14
    // Parameterized constructor
15
    public Movie(String t, int y, String g) {
       title = t;
16
       year = y;
       genre = g;
                           Data member initialization using the constructor of the "Movie" class
```

We can create a getTitle() method, which will return the title to us. Similarly, the other two members can also have corresponding getters.

There must be a way to interact with variables (title, year, and genre). They include all of the movie's

1 class Movie {

We may draw a conclusion by studying the emerging pattern. These functions should be part of the class

```
private int year;
       private String genre;
        // Default constructor
       public Movie() {
         title = "";
         year = -1;
   10
          genre = "";
  12
   13
         // Parameterized constructor
   14
         public Movie(String t, int y, String g) {
           year = y;
   17
   18
           genre = g;
   19
   20
         // getters setters
   21
   22
         public String getTitle() {
   23
           return title;
   24
   25
         public void setTitle(String t) {
           title = t;
   28
         public int getYear() {
   30
    \triangleright
                                             Implementation of encapsulation
The Movie class has an interface with public methods for communication.
The private members (variables or functions) cannot be accessed directly from the outside, but public read
```

and write functions allow access to them. This, in essence, is data encapsulation.

Advantages of encapsulation

#### Classes are simpler to modify and maintain. • Which data member we wish to keep hidden or accessible can be specified.

- We choose which variables are read-only and write-only (increases flexibility).
- In the next lesson, we will discuss the concept of abstraction in detail.

