Encapsulation

This lesson shows us how to implement the first component of data hiding: encapsulation.

WE'LL COVER THE FOLLOWING

A Real Life Example

For the sake of explanation, we'll start off by creating a simple `movie` class which contains three members:

```
class Movie{
  string title;
  int year;
  string genre;

  public:
  Movie(){
    title = "";
    year = -1;
    genre = "";
  }

  Movie(string t, int y, string g){
    title = t;
    year = y;
    genre = g;
  }
};
```

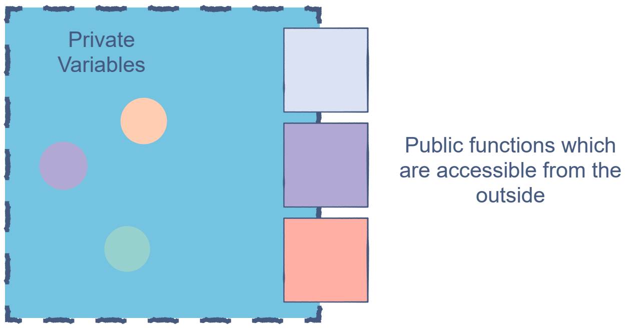
There must be a way to interact with the `title`, `year` and `genre` variables. They hold all the information about a movie, but how do we access or modify them?

We could create a `getTitle()` method which would return the title to us. Similarly, the other two members could also have corresponding `get` functions.

By observing the emerging pattern, we can make a definitive conclusion. These functions should be part of the class of itself! Let’s try it out.

```
#include <iostream>
#include <string>
using namespace std;

class Movie{
  string title;
  int year;
  string genre;

  public:
  Movie(){
    title = "";
    year = -1;
    genre = "";
  }

  Movie(string t, int y, string g){
    title = t;
    year = y;
    genre = g;
  }

  string getTitle(){
    return title;
  }
  void setTitle(string t){
    title = t;
  }

  int getYear(){
    return year;
  }
  void setYear(int y){
    year = y;
  }

  string getGenre(){
    return genre;
  }
  void setGenre(string g){
    genre = g;
  }

  void printDetails(){
    cout << "Title: " << title << endl;
    cout << "Year: " << year << endl;
    cout << "Genre: " << genre << endl;
  }
};

int main() {
  Movie m("The Lion King", 1994, "Adventure");
  m.printDetails();
  cout << "---" << endl;
  m.setTitle("Forrest Gump");

  cout << "New title: " << m.getTitle() << endl;
}
```

We have now provided an interface of public methods to interact with the `Movie` class. Our private variables cannot be accessed directly from the outside, but we have provided read and write functions which allow access those variables.



This, in essence, is **data encapsulation**.

Advantages of Encapsulation

- Classes are easier to change and maintain.
- We can specify which data member we want to keep hidden or accessible.
- We decide which variables have read/write privileges (increases flexibility).

In the next lesson, we'll discuss the second component of data hiding: **abstraction**.