📘 Understanding C++ Classes

🧠 What is a Class?

A **class** in C++ is a **user-defined** data type that serves as a blueprint for creating **objects**. It encapsulates **member variables** (fields) and **member functions** (methods) that operate on the data, following the principles of **Object-Oriented Programming (OOP)**.

🧱 Syntax of a Class

> NOTE: classes are usually declared in header files.

```
class ClassName {
  private:
    // Private data members

  protected:
    // Protected members

  public:
    // Public methods and constructors
};
```

🔐 Access Modifiers in C++

Access modifiers control the **visibility** and **accessibility** of class members (variables and functions). C++ provides three main access specifiers:

1. `private`

- **Default** access level for class members.
- Members are **only accessible** within the class itself.
- Used to **encapsulate** and protect internal data.

```
class Example {
  private:
    int secret;

  public:
    void setSecret(int s) { secret = s; }
    int getSecret() { return secret; }
};
```

2. `public`

- Members are **accessible from outside** the class.
- Used to define the **interface** of the class.

```
class Example {
  public:
    int id;
    void showID() { cout << "ID: " << id << endl; }
};
```

3. `protected`

- Members are **not accessible** from outside the class.
- But they are accessible in **derived (child) classes**.
- Useful in **inheritance** scenarios.

```
class Base {
  protected:
    int value;
};

class Derived : public Base {
  public:
    void setValue(int v) { value = v; }
    int getValue() { return value; }
};
```

🚗 Example: A Simple `Car` Class

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

class Car {
  private:
    string brand;
    int year;

  public:
    Car(string b, int y) {
        brand = b;
        year = y;
    }

    void displayInfo() {
        cout << "Brand: " << brand << ", Year: " << year << endl;
    }
};

int main() {
    Car car1("Toyota", 2020);
    car1.displayInfo();

    return 0;
}
```

✅ Summary Table

Access Modifier	Accessible Within Class	Accessible Outside Class	Accessible in Derived Class
`private`	✅ Yes	❌ No	❌ No
`protected`	✅ Yes	❌ No	✅ Yes
`public`	✅ Yes	✅ Yes	✅ Yes

🎯 Quiz!

Here's a short quiz on the topic: quiz

🔭 Markdown Viewer

How to view the markdown files in a browser...

- Markdown Viewer

🧠 Lecture Practices

Here are the lecture Practices...

- Day 7
- Day 8
- Day 9

🔍 Lecture Quizzes

Here are the lecture quizzes...

- Day 7
- Day 8
- Day 9

Weekly Topics

Here are the topics for the week...

- Classes
- Structs
- Fields
- Getters and Setters
- Constructors
- Instances
- Inheritance
- Polymorphism
- Pointers
- Upcasting
- Misc. Concepts
- 4 Pillars of OOP