C++ OOP Learning Roadmap

Prerequisites

1. Basic C++ syntax and structure
2. Data types, variables, input/output
3. Control flow: if-else, switch, loops (for, while, do-while)
4. Functions and parameter passing
5. Arrays and strings
6. Basic knowledge of pointers and references
7. Understanding of header files and namespaces

Day 1: Introduction to OOP

1. Concept of OOP vs Procedural Programming
2. Pillars of OOP: Abstraction, Encapsulation, Inheritance, Polymorphism
3. Task: Write a summary of differences between OOP and Procedural Programming

Day 2: Classes and Objects

1. Defining classes and creating objects
2. Access modifiers (public, private, protected)
3. Task: Create a class representing a Book with attributes and methods
4. Mini Project: Student Record System

Day 3: Constructors and Destructors

1. Default, parameterized, and copy constructors
2. Destructor and memory cleanup
3. Task: Class with all types of constructors
4. Exercise: Implement a Counter class

Day 4: Inheritance

1. Single, multiple, multilevel, hierarchical, hybrid inheritance
2. Accessing base class members
3. Task: Demonstrate multilevel inheritance with constructors
4. Mini Project: Employee Management System

Day 5: Polymorphism

1. Compile-time (function overloading, operator overloading)
2. Runtime (virtual functions and overriding)
3. Task: Function and operator overloading example
4. Exercise: Shape class with virtual area() function

Day 6: Encapsulation and Abstraction

1. Difference between encapsulation and abstraction
2. Data hiding and access control

3. Task: ATM class demonstrating abstraction
4. Mini Project: Bank Account Simulation

Day 7: Pointers to Objects and 'this' Pointer

1. Using pointers with objects
2. 'this' pointer usage
3. Task: Create class with chained method calls using 'this'
4. Exercise: Inventory System

Day 8: Static Members and Friend Functions

1. Static variables and methods
2. Friend functions and friend classes
3. Task: Demonstrate static count of objects
4. Exercise: Use friend function to access private members

Day 9: File Handling in OOP

1. Reading/writing files using classes
2. File I/O operations (ifstream, ofstream)
3. Task: Write student data to a file using class
4. Mini Project: File-based Contact Book

Day 10: OOP Project Day

1. Mini Project: Library Management System / Quiz Game / Simple E-commerce Cart
2. Wrap up all concepts used in OOP
3. Document your code and learning