30-Day C++ OOPs + STL Practice Ladder

Day 1: Create a Class and Print Attributes (OOPs - Class, Access Specifiers)

Create a class `Person` with two public attributes: `name` (string) and `age` (int). Create an object and print the attributes.

Output Example:

Name: Alice

Age: 25

Day 2: Student Class with Average Calculator (OOPs - Constructor, Member Functions)

Create a class 'Student' with marks in 3 subjects as private data. Use a constructor to initialize them. Write a member function to calculate and print the average marks.

Output Example:

Average Marks: 85.33

Day 3: Implement a Pair Class Template (Templates, OOPs)

Write a template class `MyPair<T1, T2>` that stores two values. Add a function to print both values.

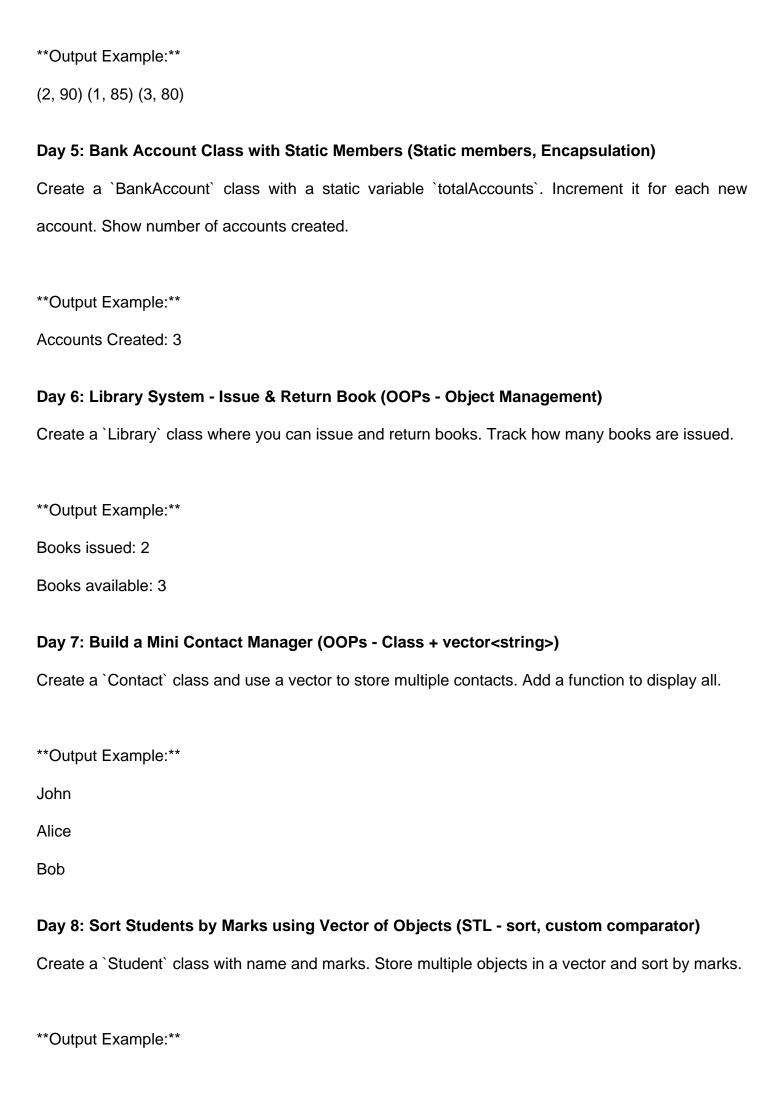
Output Example:

First: John

Second: 42

Day 4: Custom Comparator for Sorting Pairs (STL - pair, vector, sort)

Given a vector of pairs of (int, int), sort them by second value descending. Use a custom comparator.



Alice: 95
Bob: 90
John: 88
Day 9: Basic Vector Operations (STL - vector)
Perform vector operations: push, pop, insert at index, and print vector elements.
Output Example:
Vector: 10 20 15 30
vector. 10 20 15 50
Day 10: Word Frequency Counter (STL - map, string manipulation)
Take a sentence and use a map to count frequency of each word.
Output Example:
Hello: 2
World: 1
Day 11: Implement Stack using STL (STL - stack, class wrapper)
Wrap STL `stack` inside a class `MyStack`. Add push, pop, and top functions.
Output Example:
Top: 5
Day 12: Vehicle Inheritance Hierarchy (Single Inheritance, Base/Derived classes)
Base class: Vehicle. Derived class: Car. Print features from both.
Output Example:
Vehicle: 4 wheels
Car: AC included

Day 13: Shape Class with Area Calculation (Polymorphism)

Create base class	'Shana'	with virtual	`area()`	and derived	classes	`Circle`	'Square'
Create base class	Shape	with virtual	area()	and derived	Classes	Circle,	Square.

Output Example:

Area of Circle: 78.5

Area of Square: 25

Day 14: Bank Account - Savings & Current (Function Overriding)

Base: `Account` with `displayBalance()`. Override it in `Savings` and `Current`.

Output Example:

Savings Balance: 1000

Current Balance: 2000

Day 15: Protected Data in Inheritance (Protected Access + Inheritance)

Base class has 'protected: int id'. Derived class sets and prints it.

Output Example:

ID: 101

Day 16: Task Scheduler with Priority Queue (STL - priority_queue, pair)

Store tasks with priority using priority_queue. Print tasks in priority order.

Output Example:

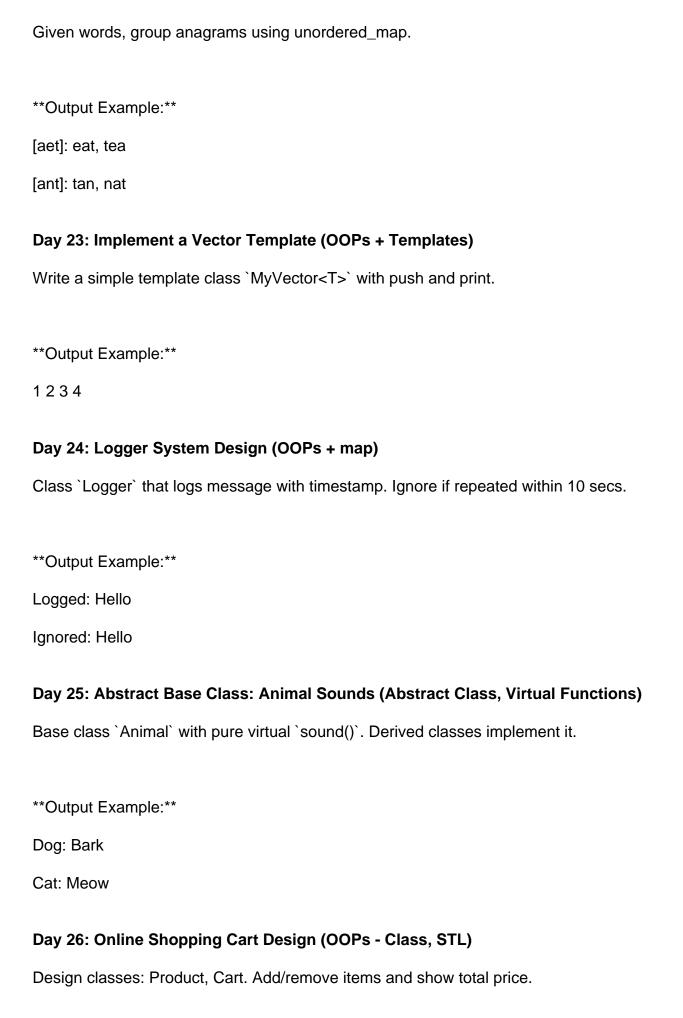
Task3 (Priority 5)

Task1 (Priority 3)

Day 17: Remove Duplicates using Set (STL - set, vector)

Given a vector with duplicates, remove them using set.

Output Example:
Unique elements: 1 2 3 4
Day 18: Deque Operations - Palindrome Checker (STL - deque)
Use deque to check if a string is a palindrome.
Output Example:
Is Palindrome: Yes
Day 19: Custom String Class with Operator Overloading (OOPs - Operator Overload)
Overload `+` to concatenate strings using a custom class.
Output Example:
HelloWorld
Day 20: Queue using Two Stacks (STL - stack, logic)
Implement queue functions `enqueue`, `dequeue` using two stacks.
Output Example:
Front: 10
Day 21: Movie Booking System Design (OOPs - Composition)
Design classes: Movie, Show, Booking. Create and book a show.
Output Example:
Booked Show: Avengers at 7PM
Day 22: Group Anagrams (STL - unordered_map)



Output Example:
Total: \$320
Day 27: Mini File System (Inheritance, Tree Structure)
Create Folder/File hierarchy. Add and list contents.
Output Example:
Root -> Folder1 -> FileA.txt
Day 28: Custom Hash Function in Unordered Map (Advanced STL)
Use unordered_map with a custom hash function for a custom class.
Output Example:
Element found: True
Day 29: LRU Cache using List and Map (STL - list, map)
Implement LRU cache with get/put using list+map.
Output Example:
Accessed: 3
Evicted: 1
Day 30: Parking Lot System (OOPs + Inheritance + STL)
Design classes: Vehicle, ParkingLot. Park/unpark vehicles.
Output Example:
Car Parked: A1
Slot Freed: A1