DAY 15

1. **Design a Payment Gateway System:** Create an abstract class Payment with an abstract method processPayment(double amount) and a concrete method verifyTransaction(). Implement two subclasses: CreditCardPayment and PayPalPayment. Each subclass must implement processPayment() uniquely, and you should use a single Payment reference type to process different payment objects (demonstrating polymorphism).

2. **Find the Missing Number:** Given an array nums containing n distinct numbers taken from $0, 1, 2, \ldots, n$, find the single number that is missing from the array. Solve this efficiently without using sorting (Hint: Consider using a mathematical property or the XOR operator).

3. Implement a Logger Utility: Define an interface Logger with a method log(String message). Implement two classes: ConsoleLogger and FileLogger. Write a main method that uses the Logger interface to switch logging output between the console and a file without changing the client code.

4. **Find the Second Largest Element:** Write a program to find the second largest element in a given integer array without using any built-in sorting methods from the Arrays or Collections utility classes. You must only traverse the array once.

5. **Count Character Frequencies:** Write a program that takes a string and uses a HashMap to count and print the frequency of every character in that string.