3-Month Internship Program

(12 Weeks): JAVA Training

Week 1: Introduction to Java

- **Topics:**
- **Java basics: Syntax, data types, variables**
- **Input and output (Scanner and System.out)**
- **Control structures (if-else, loops)**
- **Assignment:**
- **Write a Java program to calculate the factorial of a number using loops.**

Week 2: Object-Oriented Programming (OOP) Basics

- **Topics:**
  - **Classes and objects**
  - **Constructors and methods**
  - **Access modifiers (public, private, protected)**
- **Assignment:**
  - **Create a class Student with attributes (name, age, and grade). Write methods to display student details and calculate the grade based on marks.**

Week 3: Advanced OOP Concepts

- **Topics:**
  - **Inheritance**
  - **Polymorphism (method overloading and overriding)**
  - **Abstract classes and interfaces**
- **Assignment:**
  - **Create an abstract class Shape with a method calculateArea(). Implement this**
  - **in subclasses Circle and Rectangle.**

Week 4: Collections Framework

- **Topics:**
  - **Introduction to collections (List, Set, Map)**
  - **ArrayList and LinkedList**
  - **HashMap and TreeMap**
- **Assignment:**
  - **Write a program to manage a library system where you store books in a HashMap with unique IDs. Allow users to add, view, and delete books.**

Week 5: Exception Handling

- **Topics:**
  - **Try-catch blocks**
  - **Throw, throws, and finally**
  - **Custom exceptions**
- **Assignment:**
  - **Create a custom exception InsufficientBalanceException and write a program to simulate a bank account where withdrawals may throw this exception.**

Week 6: File Handling

- **Topics:**
  - **Reading from and writing to files**
  - **FileReader, FileWriter, and BufferedReader**
  - **Serialization and Deserialization**
- **Assignment:**
  - **Write a program to read a text file, count the number of words, and write the output to another file.**

Week 7: Multi-threading

- **Topics:**
    - Thread lifecycle
    - Creating threads (Thread class and Runnable interface)
    - Synchronization and inter-thread communication
- **Assignment:**
    - Write a program where two threads print numbers alternatively (e.g., Thread1: 1, Thread2: 2, Thread1: 3, …).

Week 8: JDBC (Java Database Connectivity)

- **Topics:**
    - Connecting to a database
    - CRUD operations
    - PreparedStatement and ResultSet
- **Assignment:**
    - Create a Java application to manage employee records in a database. Implement CRUD operations using JDBC.

Week 9: Swing and GUI Programming

- **Topics:**
    - Introduction to Swing components (JFrame, JPanel, JButton, JTextField)
    - Event handling
    - Layout managers
- **Assignment:**
    - Create a simple calculator with a GUI using Swing that performs basic arithmetic operations.

Week 10: RESTful API Integration

- Topics:
  - Introduction to REST APIs
  - Making HTTP requests in Java (using HttpClient or third-party libraries like OkHttp)
  - Parsing JSON responses (using libraries like Jackson or Gson)
- Assignment:
  - Write a program to fetch weather information from an open API and display it in the console.

Week 11: Advanced Java Concepts

- Topics:
  - Java 8 features (Streams, Lambda expressions, Optional)
  - Functional interfaces and method references
  - Introduction to Spring Framework (optional for interns)
- Assignment:
  - Write a program to demonstrate the use of Java Streams to filter, sort, and collect data from a list of objects.

Week 12: Final Project

- Topics:
  - Combine all learned concepts to build a small application
  - Debugging and testing
- Assignment:
  - Develop a "To-Do List Manager" application.