SDLC ASSIGNMENT – 8

Skill Description:

Apply software design concepts to create a comprehensive design document for the development of EduLearn Pro, a revolutionary e-learning platform. Gain hands-on experience in assessing and improving coupling and cohesion within a specific module of the application. This assignment focuses on enhancing practical skills in software design, architectural patterns, and principles, while also emphasizing the importance of modular and maintainable design practices. Scenario Background: You are a software architect at InnovateTech Solutions, a company specializing in creating cutting-edge applications. The company is currently working on developing a new e-learning platform, EduLearn Pro, to revolutionize online education.

Problem Statement 8: Software Design Concepts

As the lead designer for EduLearn Pro, create a detailed software design document outlining the high-level design principles, architectural patterns, and design patterns that will be employed in the platform. Consider scalability, maintainability, and flexibility in your design choices.

Learning Outcomes:

- Apply software design concepts to create a comprehensive design document.
- Demonstrate an understanding of high-level design principles and patterns.

This assignment provides students with hands-on experience in applying software design concepts to a real-world scenario. By working on the design of EduLearn Pro, students will enhance their skills in creating scalable and maintainable software, while also gaining a deeper understanding of coupling and cohesion principles in the context of a specific module.

Software Design Document for EduLearn Pro

1. Project Overview

- Objective: Design a scalable, maintainable, and flexible e-learning platform, EduLearn Pro.
- Role: Lead Software Architect at InnovateTech Solutions.

2. High-Level Design Principles

- Scalability: Use a microservices architecture to ensure the system can scale horizontally.
- Maintainability: Follow SOLID principles and ensure modularity.
- Flexibility: Implement a plug-and-play module system for future feature integration.

3. Architectural Patterns

- Microservices Architecture:
  - Modular services for user management, course content, assessments, and analytics.
  - Enables independent scaling and easier maintenance.
- Service-Oriented Architecture (SOA):
  - Standardizes communication between modules using REST APIs.
  - Facilitates third-party integration and external services.

4. Design Patterns

- Creational Patterns:
  - Singleton: Manage database connections.
  - Factory Method: Create instances of learning modules dynamically.
- Structural Patterns:
  - Facade: Simplify interaction with complex subsystems like reporting and notifications.
  - Adapter: Integrate third-party payment gateways.
- Behavioral Patterns:
  - Observer: Notify students about course updates and new content.
  - Strategy: Allow customizable content recommendations based on learning styles.

5. Key Modules and Responsibilities

- User Management: Handles authentication, role-based access, and profile management.
- Course Management: Manages course creation, updates, and content delivery.
- Assessment Module: Provides quizzes, assignments, and grading functionalities.
- Analytics Engine: Generates progress reports and performance insights.

6. Coupling and Cohesion Improvements

- Reduced Coupling:
  - Use interfaces and dependency injection.
  - Implement service discovery for seamless module interaction.
- Increased Cohesion:
  - Ensure each module has a single responsibility.
  - Organize related functions within modules logically.

7. Conclusion

By applying these design principles, architectural patterns, and design patterns, EduLearn Pro will be a robust, scalable, and maintainable e-learning platform, ready to revolutionize online education.