CSC 430
Software Architecture and design
Lab 3 : Structural Patterns

Spring 2024

Exercise 1:

You are tasked with integrating a legacy payment processing system, represented by the PaymentGateway class, into a modern payment processing framework (ModernPaymentProcessor). The modern system expects payments to be processed using the processPayment() method. However, the existing system only supports the makePayment() method. Your goal is to create an adapter that seamlessly integrates the old payment system into the new one.

```
public class PaymentGateway {
   void makePayment() {
     System.out.println("Processing payment using the old payment gateway.");
    }
}
```

Exercise 2:

You are developing a system that manages access to a critical database containing sensitive information. The database interface is represented by the Database interface, which has a method queryData() to retrieve data. However, you need to restrict access to this method based on the user's role. The roles are represented by the UserRole enum, with values ADMIN and USER.

Tasks:

1. **Define Database Interface:**

   - Create the Database interface with a method queryData().

2. **Implement Real Database:**

   - Create the RealDatabase class that implements the Database interface.
   - Implement the queryData() method to simulate querying sensitive data.

3. **Create Protection Proxy:**

   - Develop the DatabaseProxy class, which also implements the Database interface.
   - Implement a protection mechanism in the DatabaseProxy to restrict access to the queryData() method based on the user's role.
   - Users with the role ADMIN should have unrestricted access, while users with the role USER should be denied access.

4. **Test the Protection Proxy:**

   - Create 2 instances of DatabaseProxy.
   - Simulate a scenario where both an ADMIN user and a USER user attempt to query data.
   - Print messages indicating whether the access was granted or denied.