

SOLID & OOPS NOTES – Document Editor Project (Hinglish)

Project Overview:

Ye project ek Document Editor hai jisme hum text, image, new line, tab jaise elements add kar sakte hain. Har feature alag class handle karti hai jo SOLID principles follow karti hai.

OOPS CONCEPTS

1. Abstraction

DocumentElement ek abstract class hai jo sirf render() method define karti hai. User ko ye nahi pata render kaise ho raha, bas itna pata hai ki har element render karega.

2. Inheritance

TextElement, ImageElement, NewLineElement sab DocumentElement se inherit karte hain. Isse code reuse hota hai aur common structure milta hai.

3. Polymorphism

Document class har element par element.render() call karti hai. Element text ho, image ho ya newline – behavior alag hota hai but method same rehta hai.

4. Encapsulation

Har class apna data aur methods ek jagah rakhti hai. TextElement apna text bahar expose nahi karta, sirf render ke through deta hai.

5. Composition

Document ke paas multiple DocumentElement hote hain (HAS-A relation). Editor ke paas Document aur Storage hota hai.

SOLID PRINCIPLES

S – Single Responsibility Principle

Har class ka sirf ek kaam hai. TextElement sirf text render karta hai. FileStorage sirf save karta hai. Isliye change ka ek hi reason hota hai.

O – Open/Closed Principle

System extension ke liye open hai par modification ke liye closed. Agar new element add karna ho to new class banao, existing code change nahi karna padta.

L – Liskov Substitution Principle

TextElement aur ImageElement dono DocumentElement ki jagah safely use ho sakte hain. Document ko farq nahi padta kaunsa element hai.

I – Interface Segregation Principle

DocumentElement me sirf ek hi method hai – render(). Koi extra method nahi hai jo child classes ko force kare.

D – Dependency Inversion Principle

DocumentEditor directly FileStorage pe depend nahi karta. Wo Persistence abstraction pe depend karta hai. Isse future me DBStorage easily add kar sakte hain.

Conclusion:

Ye project real-world clean architecture follow karta hai aur interview-ready example hai.