

Design Patterns

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context

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introduction

- Design patterns represent the best practices used by experienced object-oriented software developers.
- Design patterns are solutions to general problems that software developers faced during software development.
- These solutions were obtained by trial and error by numerous software developers over quite a substantial period of time.

What is Gang of Four (GOF)?

- In 1994, four authors Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides published a book titled **Design Patterns - Elements of Reusable Object-Oriented Software** which initiated the concept of Design Pattern in Software development.
- These authors are collectively known as **Gang of Four (GOF)**. According to these authors design patterns are primarily based on the following principles of object orientated design.
 - Program to an interface not an implementation
 - Favor object composition over inheritance

Usage of Design Pattern

Design Patterns have two main usages in software development.

❖ **Common platform for developers**

- Design patterns provide a standard terminology and are specific to particular scenario.
- For example, a singleton design pattern signifies use of single object so all developers familiar with single design pattern will make use of single object and they can tell each other that program is following a singleton pattern.

❖ **Best Practices**

- Design patterns have been evolved over a long period of time and they provide best solutions to certain problems faced during software development.
- Learning these patterns helps inexperienced developers to learn software design in an easy and faster way.

Types of Design Patterns

- As per the design pattern reference book **Design Patterns - Elements of Reusable Object-Oriented Software** , there are 23 design patterns which can be classified in three categories:
 - Creational,
 - Structural
 - Behavioral patterns.
- We'll also discuss another category of design pattern: J2EE design patterns.

Creational Design Pattern

- These design patterns provide a way to create objects while hiding the creation logic, rather than instantiating objects directly using new operator.
- this gives program more flexibility in deciding which objects need to be created for a given use case.
 - Factory Pattern
 - Singleton pattern
 - Abstract factory pattern
 - Builder pattern
 - Prototype pattern
 - observern

Structural Design pattern

- Provide different ways to create a class structure.
- For example using inheritance and composition to create a large object from small objects
 - Adapter pattern
 - Composite pattern
 - Proxy pattern
 - Flyweight pattern
 - Bridge pattern
 - Decorator pattern

Behavioral Design Patterns

- These design patterns are specifically concerned with communication between objects.
 - Template method pattern
 - Mediator pattern
 - Chain of Responsibility
 - Observer pattern
 - Strategy pattern
 - Command pattern
 - State pattern
 - Visitor pattern
 - Interpreter pattern
 - Memento pattern

Cont...

S.N.	Pattern & Description
1	Creational Patterns These design patterns provide a way to create objects while hiding the creation logic, rather than instantiating objects directly using new operator. This gives program more flexibility in deciding which objects need to be created for a given use case.
2	Structural Patterns These design patterns concern class and object composition. Concept of inheritance is used to compose interfaces and define ways to compose objects to obtain new functionalities.
3	Behavioral Patterns These design patterns are specifically concerned with communication between objects.

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