Design Patterns in Java

A design patterns are **well-proved solution** for solving the specific problem/task.

Now, a question will be arising in your mind what kind of specific problem? Let me explain by taking an example.

**Problem Given:**  
Suppose you want to create a class for which only a single instance (or object) should be created and that single object can be used by all other classes.

**Solution:**  
**Singleton design pattern** is the best solution of above specific problem. So, every design pattern has **some specification or set of rules** for solving the problems. What are those specifications, you will see later in the types of design patterns.

But remember one-thing, design patterns are programming language independent strategies for solving the common object-oriented design problems. That means, a design pattern represents an idea, not a particular implementation.

By using the design patterns you can make your code more flexible, reusable and maintainable. It is the most important part because java internally follows design patterns.

To become a professional software developer, you must know at least some popular solutions (i.e. design patterns) to the coding problems.

Advantage of design pattern:

1. They are reusable in multiple projects.
2. They provide the solutions that help to define the system architecture.
3. They capture the software engineering experiences.
4. They provide transparency to the design of an application.
5. They are well-proved and testified solutions since they have been built upon the knowledge and experience of expert software developers.
6. Design patterns don?t guarantee an absolute solution to a problem. They provide clarity to the system architecture and the possibility of building a better system.

When should we use the design patterns?

We must use the design patterns **during the analysis and requirement phase of SDLC**(Software Development Life Cycle).

Design patterns ease the analysis and requirement phase of SDLC by providing information based on prior hands-on experiences.

Categorization of design patterns:

Basically, design patterns are categorized into two parts:

1. Core Java (or JSE) Design Patterns.
2. JEE Design Patterns.

Core Java Design Patterns

In core java, there are mainly three types of design patterns, which are further divided into their sub-parts:

1.Creational Design Pattern

1. Factory Pattern
2. Abstract Factory Pattern
3. Singleton Pattern
4. Prototype Pattern
5. Builder Pattern.

2. Structural Design Pattern

1. Adapter Pattern
2. Bridge Pattern
3. Composite Pattern
4. Decorator Pattern
5. Facade Pattern
6. Flyweight Pattern
7. Proxy Pattern

3. Behavioral Design Pattern

1. Chain Of Responsibility Pattern
2. Command Pattern
3. Interpreter Pattern
4. Iterator Pattern
5. Mediator Pattern
6. Memento Pattern
7. Observer Pattern
8. State Pattern
9. Strategy Pattern
10. Template Pattern
11. Visitor Pattern

Creational design patterns

Creational design patterns are concerned with**the way of creating objects.** These design patterns are used when a decision must be made at the time of instantiation of a class (i.e. creating an object of a class).

But everyone knows an object is created by using new keyword in java. For example:

1. StudentRecord s1=**new** StudentRecord();

Hard-Coded code is not the good programming approach. Here, we are creating the instance by using the new keyword. Sometimes, the nature of the object must be changed according to the nature of the program. In such cases, we must get the help of creational design patterns to provide more general and flexible approach.

Types of creational design patterns

There are following 6 types of creational design patterns.

1. [Factory Method Pattern](https://www.javatpoint.com/factory-method-design-pattern)
2. [Abstract Factory Pattern](https://www.javatpoint.com/abstract-factory-pattern)
3. [Singleton Pattern](https://www.javatpoint.com/singleton-design-pattern-in-java)
4. [Prototype Pattern](https://www.javatpoint.com/prototype-design-pattern)
5. [Builder Pattern](https://www.javatpoint.com/builder-design-pattern)
6. [Object Pool Pattern](https://www.javatpoint.com/object-pool-pattern)