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Design Patterns

In the first chapter of this book, we learned that a design pattern is a re-usable solution that can be used in our projects so that time-tested programming techniques can be employed to solve similar kinds of problems. This chapter is devoted exclusively to design patterns and how we can use some of the famous design patterns in our ASP.NET web applications.

In the previous chapters we have already studied some design patterns such as:

- **Lazy Loading design pattern**: This is used to defer the loading of object properties until needed. This pattern helped us improve performance as data was only loaded when required.
- **Page controller design:** This is used to move the programming logic from markup to code-behind controller files for better code management.
- **Front controller design:** This is a centralized controller based approach to get rid of issues with page controller approach.
- **MVC design:** This is a powerful pattern used to separate the view from logic based on a front controller based design

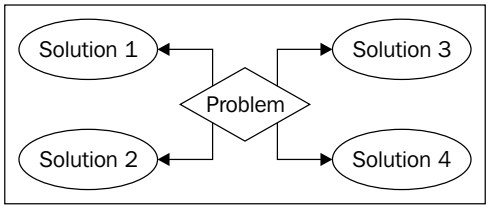
In this chapter, we will focus on the following:

- Understanding different categories of design patterns
- Implementing the Singleton pattern
- Implementing the Factory pattern
- Understanding and implementing Dependency Injection
- Understanding the Command Design Pattern

Understanding Design Patterns

Design patterns not only help us to solve problems, but also gives us an assurance that the solutions will work and are stable, because these patterns have been tried and tested over the years by many other programmers. As we read earlier, design patterns are simple, and provide the best solutions to some of the common problems that developers face. Hence, they are more reliable than an ingenious solution to a problem that may have already been solved by others.

Any software problem can have many solutions, as depicted by the following diagram:



Some of these solutions might be innovatively new and use creative methods of finding an approach and a possible answer to a problem. Some solutions might be workable but not efficient. When it comes to deciding for the best approach for our current problem, we should first try to learn from the past, and understand how similar problems might have been solved by others. This is where **design patterns** come into picture.

History of Patterns

Much of the foundation of the design patterns was laid down by the "**Gang of Four**" (**GoF**)—Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, in their famous book "Design Patterns". The Gang of Four categorized design patterns into three groups:

- Creational
- Structural
- Behavioral

Creational patterns deal with different ways of creating an object to suit a particular scenario. One of the famous examples is the factory design pattern.

Structural patterns are related to the way in which a group of objects should be structured to achieve a goal, and how the relationships should be maintained between different objects. The Adapter pattern is a well known example of structural design pattern.