**Week 1**

| Exercise 1: Implementing the Singleton Pattern  Code:  using System;  namespace SingletonPatternExample  {  public class Logger  {  private static Logger? instance;  private Logger()  {  Console.WriteLine("Logger instance created.");  }  public static Logger GetInstance()  {  if (instance == null)  instance = new Logger();  return instance;  }  public void Log(string message)  {  Console.WriteLine("Log: " + message);  }  }  class Program  {  static void Main(string[] args)  {  Logger logger1 = Logger.GetInstance();  logger1.Log("This is the first log message");  Logger logger2 = Logger.GetInstance();  logger2.Log("This is the second log message");  if (logger1 == logger2)  Console.WriteLine("Both logger instances are the same (singleton verified).");  else  Console.WriteLine("Different instances (singleton failed).");  }  }  }  Output: |
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| Exercise 2: Implementing the Factory Method Pattern |
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Code:

using System;

namespace FactoryMethodPatternExample

{

public interface IDocument

{

void Open();

}

public class WordDocument : IDocument

{

public void Open()

{

Console.WriteLine("Opening Word document.");

}

}

public class PdfDocument : IDocument

{

public void Open()

{

Console.WriteLine("Opening PDF document.");

}

}

public class ExcelDocument : IDocument

{

public void Open()

{

Console.WriteLine("Opening Excel document.");

}

}

public abstract class DocumentFactory

{

public abstract IDocument CreateDocument();

}

public class WordDocumentFactory : DocumentFactory

{

public override IDocument CreateDocument()

{

return new WordDocument();

}

}

public class PdfDocumentFactory : DocumentFactory

{

public override IDocument CreateDocument()

{

return new PdfDocument();

}

}

public class ExcelDocumentFactory : DocumentFactory

{

public override IDocument CreateDocument()

{

return new ExcelDocument();

}

}

class Program

{

static void Main(string[] args)

{

DocumentFactory wordFactory = new WordDocumentFactory();

IDocument wordDoc = wordFactory.CreateDocument();

wordDoc.Open();

DocumentFactory pdfFactory = new PdfDocumentFactory();

IDocument pdfDoc = pdfFactory.CreateDocument();

pdfDoc.Open();

DocumentFactory excelFactory = new ExcelDocumentFactory();

IDocument excelDoc = excelFactory.CreateDocument();

excelDoc.Open();

}

}

}

Output:

