**EXERCISE 2: IMPLEMENTATION OF FACTORY METHOD PATTERN**

# Theory: Factory Method Pattern

The Factory Method Pattern defines an interface for creating an object but allows subclasses to alter the type of objects that will be created.  
  
Benefits:  
- Promotes loose coupling between client code and object creation logic.  
- Easier to extend the system with new types.  
  
Usage:  
- When the client code needs to work with abstract types and object creation needs to be delegated to subclasses.

Scenario:  
You are developing a document management system that needs to create different types of documents (e.g., Word, PDF, Excel). Use the Factory Method Pattern to achieve this.

**Steps:**

# 1. Create a New Java Project

Create a new Java project named `FactoryMethodPatternExample`.

# 2. Define Document Classes

Create an interface `Document` to represent the base type of all documents.  
  
public interface Document {  
 void open();  
}

# 3. Create Concrete Document Classes

Implement concrete classes for each document type:  
  
public class WordDocument implements Document {  
 public void open() {  
 System.out.println("Opening Word document");  
 }  
}  
  
public class PdfDocument implements Document {  
 public void open() {  
 System.out.println("Opening PDF document");  
 }  
}  
  
public class ExcelDocument implements Document {  
 public void open() {  
 System.out.println("Opening Excel document");  
 }  
}

# 4. Implement the Factory Method

Create an abstract factory class:  
  
public abstract class DocumentFactory {  
 public abstract Document createDocument();  
}  
  
Create concrete factories for each type:  
  
public class WordFactory extends DocumentFactory {  
 public Document createDocument() {  
 return new WordDocument();  
 }  
}  
  
public class PdfFactory extends DocumentFactory {  
 public Document createDocument() {  
 return new PdfDocument();  
 }  
}  
  
public class ExcelFactory extends DocumentFactory {  
 public Document createDocument() {  
 return new ExcelDocument();  
 }  
}

# 5. Test the Factory Method Implementation

Test class:  
  
public class FactoryTest {  
 public static void main(String[] args) {  
 DocumentFactory wordFactory = new WordFactory();  
 Document wordDoc = wordFactory.createDocument();  
 wordDoc.open();  
  
 DocumentFactory pdfFactory = new PdfFactory();  
 Document pdfDoc = pdfFactory.createDocument();  
 pdfDoc.open();  
  
 DocumentFactory excelFactory = new ExcelFactory();  
 Document excelDoc = excelFactory.createDocument();  
 excelDoc.open();  
 }  
}

# Output:

# 