National University of Computer and Emerging Sciences

Laboratory manual # 07
For
Software Design and Architecture

Course Instructor	Amir Iqbal
Lab Instructor	Muhammad Hashir Mohsineen, Syeda Aina Batool
Email	hashir.mohsineen@lhr.nu.edu.pk ainnie.batool275@gmail.com
Section	BSE-4D
Date	3-27-24 (MM/DD/YY)
Semester	Spring 24

Instructions for lab submission:
You have to submit source files along with a word document. In the word document you have to give the heading of each exercise/question, then paste your code. Save your word document in the following format: roll number-lab no-section i.e. 21I-0008-lab06-BSE4D.

Objective:

☐ Creational Design Patterns – I (Factory Method)

Software for this lab:
- Java netbeans
- StarUML

Create class diagrams and write Java code for the following:

1. Exercise: **Marks: 10**
You are developing a system for a bookstore chain that wants to manage its inventory and sales data efficiently. Each bookstore in the chain sells books across different genres such as fiction, non-fiction, mystery, and science fiction.

As a software architect, you are tasked with designing a system that utilizes the Factory Pattern in Java to manage the creation of book objects. The system should allow for the addition of new book genres without modifying existing code.

- Define interface for books.
- Create concrete implementations of the interface for different genres.
- Implement a factory interface and concrete factory classes for book creation.
- Design a Book class that utilizes the factory pattern to create book objects.
- Include mechanisms for adding new book genres without modifying existing code.

2. Exercise: **Marks: 10**
You are a software architect at a large e-commerce company that specializes in selling electronic gadgets. The company is planning to introduce a new feature where customers can customize their own laptops by selecting components such as processor, RAM, storage, and graphics card. Additionally, customers can choose from various brands for each component. As part of this project, you are tasked with

designing a system that utilizes the Factory Pattern to create customized laptops based on customer specifications.

Design and implement the system in Java, incorporating the Factory Pattern to dynamically create customized laptops.

a. Define interfaces for laptop components (processor, RAM, storage, graphics card).
b. Create concrete implementations of these interfaces for different brands (i.e Intel and AMD) and types of components.
c. Implement a factory interface and concrete factory classes for each brand type.
d. Design a Laptop class that utilizes the factory pattern to create customized laptops.