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Lab Assignment – 9

Question 1: Write a Java program that demonstrates method overriding by creating a superclass called Animal and two subclasses called Dog and Cat.

● The Animal class should have a method called makeSound(), which simply prints "The animal makes a sound."

● The Dog and Cat classes should override this method to print "TheCat/The dog meows/barks" respectively.

● The program should allow the user to create and display objects of each class.

input :

```
// Animal class
class Animal {
    public void makeSound() {
        System.out.println("The animal makes a sound.");
    }
}

// Dog class (subclass of Animal)
class Dog extends Animal {
    @Override
    public void makeSound() {
        System.out.println("The dog barks.");
    }
}

// Cat class (subclass of Animal)
class Cat extends Animal {
    @Override
```

```
    public void makeSound() {
        System.out.println("The cat meows.");
    }
}

// Main class
public class Main {
    public static void main(String[] args) {
        // Create objects
        Animal genericAnimal = new Animal();
        Dog myDog = new Dog();
        Cat myCat = new Cat();

        // Demonstrate method overriding
        genericAnimal.makeSound(); // Output: The animal makes a sound.
        myDog.makeSound();         // Output: The dog barks.
        myCat.makeSound();         // Output: The cat meows.
    }
}
```

Output:

The animal makes a sound.

The dog barks.

The cat meows.

Question 2: Create a Java abstarct class named Book.

1. Add private attributes to the Book class: title, author, and publicationYear.
2. Provide a constructor to initialize the attributes.
3. Add an abstract method, displayInfo(), to the Book class.
4. Create two subclasses: "Novel" and "Textbook." by extending Book class.
5. Override the displayInfo() method in each subclass to display specific information:
    - In the "Novel" subclass, display the genre of the novel.
    - In the "Textbook" subclass, display the subject of the textbook.

Input:

```
// Abstract Book class
abstract class Book {
    // Private attributes
    private String title;
    private String author;
    private int publicationYear;

    // Constructor
    public Book(String title, String author, int publicationYear) {
        this.title = title;
        this.author = author;
        this.publicationYear = publicationYear;
    }

    // Abstract method
    public abstract void displayInfo();
}
```

```
// Novel subclass
class Novel extends Book {
    // Additional attribute
    private String genre;

    // Constructor
    public Novel(String title, String author, int publicationYear, String genre) {
        super(title, author, publicationYear);
        this.genre = genre;
    }

    // Override displayInfo() method
    @Override
    public void displayInfo() {
        System.out.println("Title: " + getTitle());
        System.out.println("Author: " + getAuthor());
        System.out.println("Publication Year: " + getPublicationYear());
        System.out.println("Genre: " + genre);
        System.out.println("------------");
    }
}

// Textbook subclass
```

```
class Textbook extends Book {
    // Additional attribute
    private String subject;

    // Constructor
    public Textbook(String title, String author, int publicationYear, String subject) {
        super(title, author, publicationYear);
        this.subject = subject;
    }

    // Override displayInfo() method
    @Override
    public void displayInfo() {
        System.out.println("Title: " + getTitle());
        System.out.println("Author: " + getAuthor());
        System.out.println("Publication Year: " + getPublicationYear());
        System.out.println("Subject: " + subject);
        System.out.println("------------");
    }
}

// Main class
public class Main {
```

```
    public static void main(String[] args) {

        // Create objects

        Novel novel = new Novel("The Great Novel", "John Doe", 2022,
"Fiction");

        Textbook textbook = new Textbook("Java Programming", "Jane Smith",
2021, "Computer Science");



        // Call displayInfo() for each object

        novel.displayInfo();

        textbook.displayInfo();

    }

}
```

Output:

Title: The Great Novel

Author: John Doe

Publication Year: 2022

Genre: Fiction

Title: Java Programming

Author: Jane Smith

Publication Year: 2021

Subject: Computer Science
