



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment 2

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Section/Group: KRG_2B

Semester: 5th

Date of Performance: 13/08/25

Subject Name: PBLJ

Subject Code: 23CSH-304

1. Aim:

To design and implement Java programs for managing product details, library systems, and student information using classes, inheritance, and abstraction.

A) Easy Level:

- To create a Product class with attributes and constructors, and display product details.

B) Medium Level:

- To implement a library management system using a base class Book and derived classes Fiction and NonFiction.

C) Hard Level:

- To design a student information system using abstraction with an abstract class Person, and subclasses Student and Teacher.

2. Objective:

- To understand the use of classes, objects, constructors, and methods in Java.
- To apply object-oriented concepts for modeling real-world entities like products, books, students, and teachers.
- To demonstrate inheritance by extending a base class (Book) into derived classes (Fiction and NonFiction).
- To implement dynamic method invocation (runtime polymorphism) through method overriding in subclasses.
- To apply abstraction using an abstract class (Person) and enforce implementation of abstract methods in derived classes.

3. JAVA script and output:



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EASY-LEVEL PROBLEM

```
import java.util.Scanner;

class Product {
    int id;
    String name;
    double price;

    Product(int id, String name, double price)
    {
        this.id = id;
        this.name = name;
        this.price = price;
    }

    void displayDetails() {
        System.out.println("Product Details:");
        System.out.println("ID: " + id);
        System.out.println("Name: " + name);
        System.out.println("Price: " + price);
    }
}

public class ProductDemo {
    public static
    void main(String[] args) {
        Scanner sc
        = new Scanner(System.in);
        System.out.print("Product ID: ");
        int
        id = sc.nextInt();
        sc.nextLine();
        System.out.print("Name: ");
        String name = sc.nextLine();
        System.out.print("Price: ");
        double price = sc.nextDouble();

        Product p = new Product(id, name, price);
        p.displayDetails();
    }
}
```

Output:



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```
Product ID: 234
Name: Rice
Price: 230
Product Details:
ID: 234
Name: Rice
Price: 230.0
BUILD SUCCESSFUL (total time: 20 seconds)
"
```

MEDIUM LEVEL PROBLEM:

```
class Book
{   String title,
    author;
    double price;

    Book(String title, String author, double
price) {   this.title = title;   this.author
= author;
        this.price = price;
    }

    void displayDetails() {
        System.out.println("Book Details");
    }
}

class Fiction extends Book {
    Fiction(String title, String author, double price) {
        super(title, author, price);
    }

    void displayDetails() {
        System.out.println("Fiction Book Details:");
        System.out.println("Title: " + title);
        System.out.println("Author: " + author);
        System.out.println("Price: " + price);
    }
}
```



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```
}

class NonFiction extends Book {
    NonFiction(String title, String author, double price) {
        super(title, author, price);
    }

    void displayDetails() {
        System.out.println("Non-Fiction Book Details:");
        System.out.println("Title: " + title);
        System.out.println("Author: " + author);
        System.out.println("Price: " + price);
    }
}

public class LibrarySystem {    public
static void main(String[] args) {

    Fiction f = new Fiction("Harry Potter", "J.K. Rowling", 500);

    NonFiction nf = new NonFiction("A Room on the Roof ", "Ruskin Bond", 700);

    f.displayDetails();
    nf.displayDetails();

}

}
```

Output:

```
Fiction Book Details:
Title: Harry Potter
Author: J.K. Rowling
Price: 500.0
Non-Fiction Book Details:
Title: A Room on the Roof
Author: Ruskin Bond
Price: 700.0
BUILD SUCCESSFUL (total time: 0 seconds)
```



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HARD LEVEL PROBLEM

```
abstract class Person
{
    String name;
    int age;

    Person(String name, int age)
    {
        this.name = name;
        this.age = age;
    }

    abstract void displayDetails();
}

class Student extends Person {
    int rollNumber;

    Student(String name, int age, int rollNumber) {
        super(name, age);
        this.rollNumber = rollNumber;
    }

    void displayDetails() {
        System.out.println("Student Details:");
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Roll Number: " + rollNumber);
    }
}

class Teacher extends Person {
    String subject;

    Teacher(String name, int age, String subject)
    {
        super(name, age);
        this.subject = subject;
    }

    void displayDetails() {
```



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```
        System.out.println("Teacher Details:");
        System.out.println("Name: " + name);
        System.out.println("Age: " + age);
        System.out.println("Subject: " + subject);
    }
}

public class StudentInfoSystem {    public
static void main(String[] args) {    Student s
= new Student("Alice", 20, 101);
    Teacher t = new Teacher("Mr. Smith", 40, "Mathematics");

    s.displayDetails();
    t.displayDetails();
}
}
```

Output:

```
Student Details:
Name: Diksha
Age: 20
Roll Number: 101
Teacher Details:
Name: Mr. A
Age: 40
Subject: Mathematics

...Program finished with exit code 0
Press ENTER to exit console.
```