JAVA PROGRAMMING
LAB 1

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1. **Write a program to manage books, members, and borrowing transactions according to the instructions**
   Classes to Create:

   • Book (fields: title, author, ISBN, isAvailable)
   • Member (fields: name, memberId, borrowedBooks[])
   • Library
   • Stores list of Book and Member objects

   Methods:

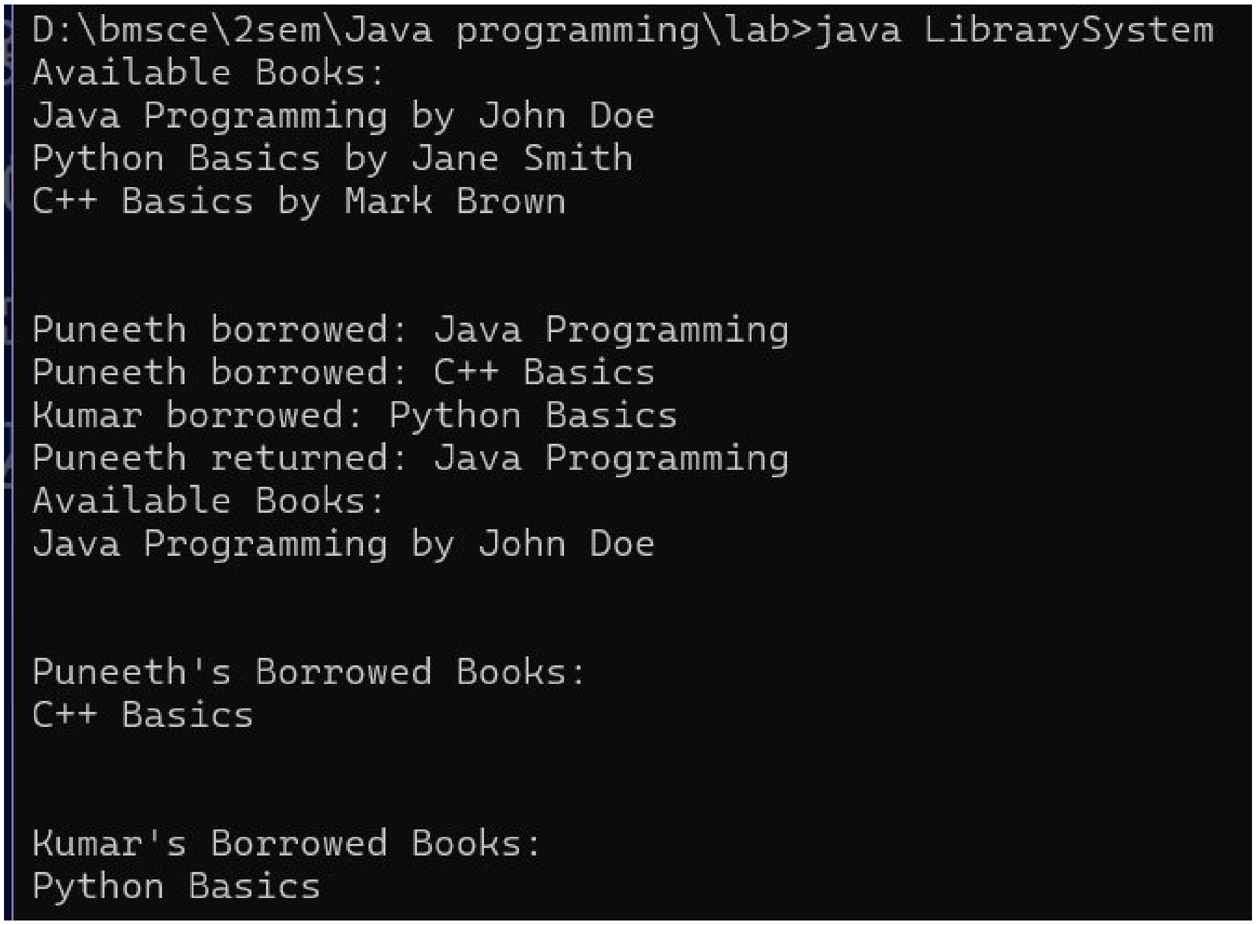
   • borrowBook(String isbn, int memberId)
   • returnBook(String isbn, int memberId)
   • listAvailableBooks()
   • listBorrowedBooks(int memberId)

   Print the necessary values.

Programm:
```
class Book {
   String title, author, ISBN;
   boolean isAvailable;

   Book(String title, String author, String ISBN, boolean isAvailable) {
      this.title = title;
      this.author = author;
      this.ISBN = ISBN;
      this.isAvailable = isAvailable;
   }
}

class Member {
   String name;
   int memberId;
   Book[] borrowedBooks = new Book[3];

   Member(String name, int memberId) {
      this.name = name;
```

```
        this.memberId = memberId;
    }
}

class Library {
    static Book[] books = new Book[3];
    static Member[] members = new Member[2];

    public static void addBook(Book book) {
        for (int i = 0; i < books.length; i++) {
            if (books[i] == null) {
                books[i] = book;
                return;
            }
        }
    }

    public static void addMember(Member member) {
        for (int i = 0; i < members.length; i++) {
            if (members[i] == null) {
                members[i] = member;
                return;
            }
        }
    }

    public static void borrowBook(String isbn, int memberId) {
        Member member = members[memberId - 1];
        for (Book book : books) {
            if (book != null && book.ISBN.equals(isbn) && book.isAvailable) {
                for (int i = 0; i < member.borrowedBooks.length; i++) {
                    if (member.borrowedBooks[i] == null) {
                        member.borrowedBooks[i] = book;
                        book.isAvailable = false;
                        System.out.println(member.name + " borrowed: " + book.title);
                        return;
                    }
                }
        System.out.println("\n");
                System.out.println(member.name + " cannot borrow more than 3 books.");
                return;
            }

        }
        System.out.println("Book not available.");
    }

    public static void returnBook(String isbn, int memberId) {
        Member member = members[memberId - 1];
        for (int i = 0; i < member.borrowedBooks.length; i++) {
            if (member.borrowedBooks[i] != null && member.borrowedBooks[i].ISBN.equals(isbn))
{
                Book book = member.borrowedBooks[i];
                member.borrowedBooks[i] = null;
                book.isAvailable = true;
                System.out.println(member.name + " returned: " + book.title);
                return;
            }
        }
        System.out.println(member.name + " did not borrow this book.");
        System.out.println("\n");
    }

    public static void listAvailableBooks() {
        System.out.println("Available Books:");
        for (Book book : books) {
            if (book != null && book.isAvailable) {
                System.out.println(book.title + " by " + book.author);
            }
        }
        System.out.println("\n");
    }
    public static void listBorrowedBooks(int memberId) {
        Member member = members[memberId - 1];
        System.out.println(member.name + "'s Borrowed Books:");
        for (Book book : member.borrowedBooks) {
            if (book != null) {
                System.out.println(book.title);
            }
        }
        System.out.println("\n");
    }
}
public class LibrarySystem {
    public static void main(String[] args) {
        Library.addBook(new Book("Java Programming", "John Doe", "123", true));
        Library.addBook(new Book("Python Basics", "Jane Smith", "456", true));
        Library.addBook(new Book("C++ Basics", "Mark Brown", "789", true));

        Library.addMember(new Member("Puneeth", 1));
        Library.addMember(new Member("Kumar", 2));
        Library.listAvailableBooks();

        Library.borrowBook("123", 1);
        Library.borrowBook("789", 1);
        Library.borrowBook("456", 2);

        Library.returnBook("123", 1);

        Library.listAvailableBooks();

        Library.listBorrowedBooks(1);
        Library.listBorrowedBooks(2);
    }
}
```

OUTPUT:



```
D:\bmsce\2sem\Java programming\lab>java LibrarySystem
Available Books:
Java Programming by John Doe
Python Basics by Jane Smith
C++ Basics by Mark Brown


Puneeth borrowed: Java Programming
Puneeth borrowed: C++ Basics
Kumar borrowed: Python Basics
Puneeth returned: Java Programming
Available Books:
Java Programming by John Doe


Puneeth's Borrowed Books:
C++ Basics


Kumar's Borrowed Books:
Python Basics
```

2. **Develop a program for an organization that manages different types of employees. There are**
general employees, managers, and interns. Each type of employee has different ways of
calculating bonuses and benefits.
• Abstract Class: Employee, Fields: name, id, baseSalary

Constructor: Initializes all fields.
Abstract methods: double calculateBonus(), String getDetails()

• Subclass: Manager

Field: department, Bonus: 20% of base salary
Overrides getDetails()

• Subclass: Intern

Field: university, Bonus: Fixed: $500
Overrides getDetails()
• Subclass: Developer

Field: level (Junior, Mid, Senior), Bonus: Junior (10%), Mid (15%), Senior (25%) of base salary
Overrides getDetails()
• Interface: Taxable

Method: double calculateTax()

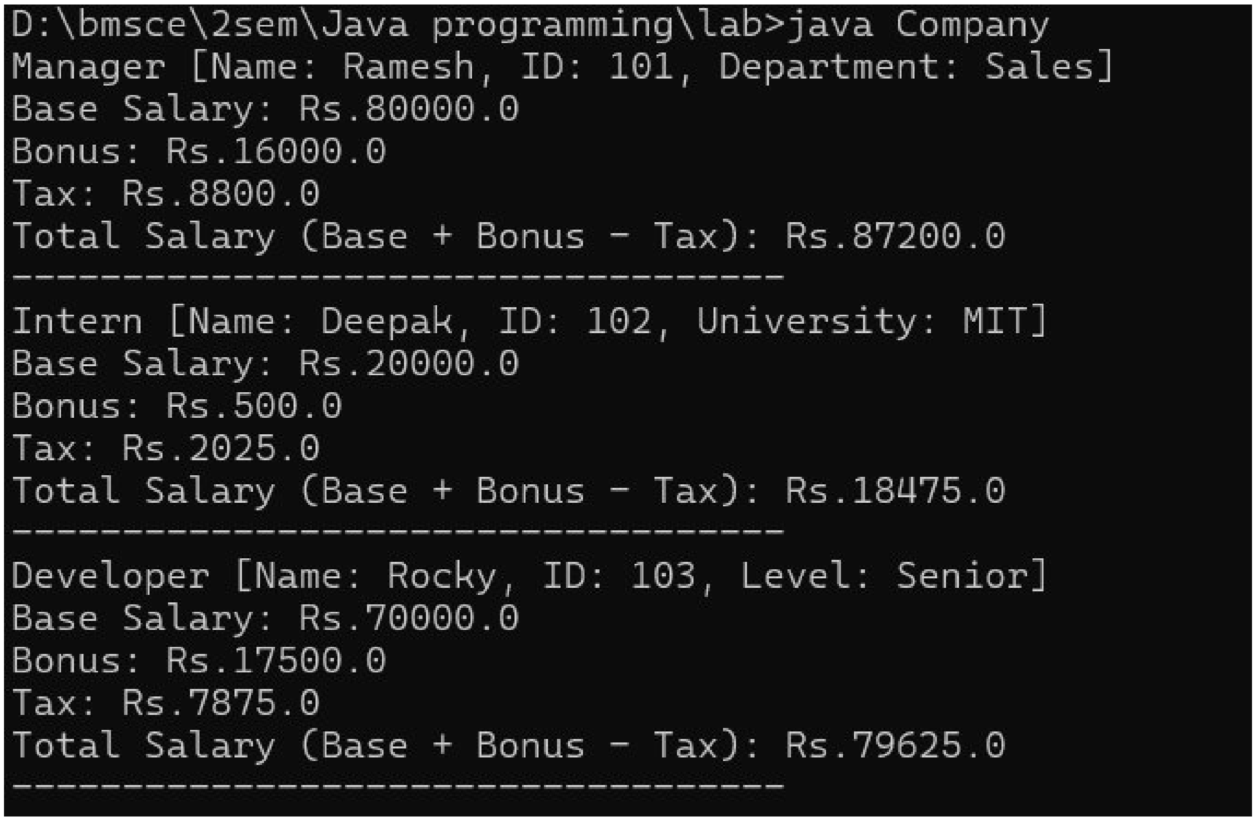
• All employees are taxable: Tax is 10% of baseSalary + 5% of bonus
• Main class: Company
➢ Print details of each employee. Display total salary, bonuses and taxes.

Programm:

```
interface Taxable {
    double calculateTax();
}

abstract class Employee implements Taxable {
    String name;
    int id;
    double baseSalary;

    Employee(String name, int id, double baseSalary) {
        this.name = name;
        this.id = id;
        this.baseSalary = baseSalary;
    }

    abstract double calculateBonus();
    abstract String getDetails();

    public double calculateTax() {
        return 0.10 * baseSalary + 0.05 * calculateBonus();
    }
}

class Manager extends Employee {
    String department;

    Manager(String name, int id, double baseSalary, String department) {
        super(name, id, baseSalary);
        this.department = department;
    }

    @Override
    double calculateBonus() {
        return 0.20 * baseSalary;
    }

    @Override
    String getDetails() {
        return "Manager [Name: " + name + ", ID: " + id + ", Department: " + department + "]";
    }
}

class Intern extends Employee {
    String university;

    Intern(String name, int id, double baseSalary, String university) {
        super(name, id, baseSalary);
        this.university = university;
    }

    @Override
    double calculateBonus() {
        return 500.0;
    }

    @Override
    String getDetails() {
        return "Intern [Name: " + name + ", ID: " + id + ", University: " + university + "]";
    }
```

```
}
class Developer extends Employee {
    String level;

    Developer(String name, int id, double baseSalary, String level) {
        super(name, id, baseSalary);
        this.level = level;
    }

    @Override
    double calculateBonus() {
        switch (level.toLowerCase()) {
            case "junior":
                return 0.10 * baseSalary;
            case "mid":
                return 0.15 * baseSalary;
            case "senior":
                return 0.25 * baseSalary;
            default:
                return 0.0;
        }
    }

    @Override
    String getDetails() {
        return "Developer [Name: " + name + ", ID: " + id + ", Level: " + level + "]";
    }
}
public class Company {
    public static void main(String[] args) {

        Employee e1 = new Manager("Ramesh", 101, 80000, "Sales");
        Employee e2 = new Intern("Deepak", 102, 20000, "MIT");
        Employee e3 = new Developer("Rocky", 103, 70000, "Senior");

        Employee[] employees = {e1, e2, e3};

        for (Employee e : employees) {
            System.out.println(e.getDetails());
            System.out.println("Base Salary: Rs." + e.baseSalary);
            System.out.println("Bonus: Rs." + e.calculateBonus());
            System.out.println("Tax: $" + e.calculateTax());
            System.out.println("Total Salary (Base + Bonus - Tax): Rs." + (e.baseSalary +
e.calculateBonus() - e.calculateTax()));
            System.out.println("-----------------------------------");
        }
```

```
  }
    }
```
OUTPUT:



```
D:\bmsce\2sem\Java programming\lab>java Company
Manager [Name: Ramesh, ID: 101, Department: Sales]
Base Salary: Rs.80000.0
Bonus: Rs.16000.0
Tax: Rs.8800.0
Total Salary (Base + Bonus - Tax): Rs.87200.0
-----------------------------------
Intern [Name: Deepak, ID: 102, University: MIT]
Base Salary: Rs.20000.0
Bonus: Rs.500.0
Tax: Rs.2025.0
Total Salary (Base + Bonus - Tax): Rs.18475.0
-----------------------------------
Developer [Name: Rocky, ID: 103, Level: Senior]
Base Salary: Rs.70000.0
Bonus: Rs.17500.0
Tax: Rs.7875.0
Total Salary (Base + Bonus - Tax): Rs.79625.0
-----------------------------------
```