TASK\_3

SOLUTION 1

import java.util.Scanner;  
  
public class Solution\_1 {  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.*in*);  
  
 // Create a Library object with a capacity of 5 books  
 Book library = new Book(5);  
  
 // Menu for interacting with the system  
 while (true) {  
 System.*out*.println("\nLibrary System Menu:");  
 System.*out*.println("1. Add Book");  
 System.*out*.println("2. Remove Book");  
 System.*out*.println("3. Search Book by ID");  
 System.*out*.println("4. Display All Books");  
 System.*out*.println("5. Exit");  
 System.*out*.print("Enter your choice: ");  
 int choice = scanner.nextInt();  
 scanner.nextLine(); // Consume the newline character  
  
 switch (choice) {  
 case 1: // Add Book  
 System.*out*.print("Enter Book ID: ");  
 int id = scanner.nextInt();  
 scanner.nextLine(); // Consume the newline  
 System.*out*.print("Enter Title: ");  
 String title = scanner.nextLine();  
 System.*out*.print("Enter Author: ");  
 String author = scanner.nextLine();  
 Solution\_1\_1 newBook = new Solution\_1\_1(id, title, author);  
 library.addBook(newBook);  
 break;  
  
 case 2: // Remove Book  
 System.*out*.print("Enter Book ID to remove: ");  
 int removeID = scanner.nextInt();  
 library.removeBook(removeID);  
 break;  
  
 case 3: // Search Book by ID  
 System.*out*.print("Enter Book ID to search: ");  
 int searchID = scanner.nextInt();  
 library.searchBookByID(searchID);  
 break;  
  
 case 4: // Display All Books  
 library.displayAllBooks();  
 break;  
  
 case 5: // Exit  
 System.*out*.println("Exiting the system...");  
 scanner.close();  
 return;  
  
 default:  
 System.*out*.println("Invalid choice! Please try again.");  
 }  
 }  
 }  
}

public class Solution\_1\_1 {  
 private int bookID;  
 private String title;  
 private String author;  
 private boolean isAvailable;  
  
 // Constructor  
 public Solution\_1\_1(int bookID, String title, String author) {  
 this.bookID = bookID;  
 this.title = title;  
 this.author = author;  
 this.isAvailable = true; // Books are available by default when created  
 }  
  
 // Getters and Setters  
 public int getBookID() {  
 return bookID;  
 }  
  
 public void setBookID(int bookID) {  
 this.bookID = bookID;  
 }  
  
 public String getTitle() {  
 return title;  
 }  
  
 public void setTitle(String title) {  
 this.title = title;  
 }  
  
 public String getAuthor() {  
 return author;  
 }  
  
 public void setAuthor(String author) {  
 this.author = author;  
 }  
  
 public boolean isAvailable() {  
 return isAvailable;  
 }  
  
 public void setAvailable(boolean isAvailable) {  
 this.isAvailable = isAvailable;  
 }  
  
 // Method to display book details  
 public void displayBookInfo() {  
 System.*out*.println("Book ID: " + bookID + ", Title: " + title + ", Author: " + author + ", Available: " + (isAvailable ? "Yes" : "No"));  
 }  
}  
  
class Book {  
 private Solution\_1\_1[] books;  
 private int bookCount;  
  
 // Constructor to initialize the library with a specific capacity  
 public Book(int capacity) {  
 books = new Solution\_1\_1[capacity];  
 bookCount = 0;  
 }  
  
 // Method to add a book to the library  
 public void addBook(Solution\_1\_1 book) {  
 if (bookCount < books.length) {  
 books[bookCount++] = book;  
 System.*out*.println("Book added: " + book.getTitle());  
 } else {  
 System.*out*.println("Library is full, cannot add more books.");  
 }  
 }  
  
 // Method to remove a book from the library by ID  
 public void removeBook(int bookID) {  
 for (int i = 0; i < bookCount; i++) {  
 if (books[i].getBookID() == bookID) {  
 for (int j = i; j < bookCount - 1; j++) {  
 books[j] = books[j + 1];  
 }  
 books[--bookCount] = null; // Decrease the book count and nullify the last element  
 System.*out*.println("Book with ID " + bookID + " has been removed.");  
 return;  
 }  
 }  
 System.*out*.println("Book with ID " + bookID + " not found.");  
 }  
  
 // Method to search for a book by its ID  
 public void searchBookByID(int bookID) {  
 for (int i = 0; i < bookCount; i++) {  
 if (books[i].getBookID() == bookID) {  
 books[i].displayBookInfo();  
 return;  
 }  
 }  
 System.*out*.println("Book with ID " + bookID + " not found.");  
 }  
  
 // Method to display all books in the library  
 public void displayAllBooks() {  
 if (bookCount == 0) {  
 System.*out*.println("No books in the library.");  
 } else {  
 for (int i = 0; i < bookCount; i++) {  
 books[i].displayBookInfo();  
 }  
 }  
 }  
}

OUTPUT

Library System Menu:

1. Add Book

2. Remove Book

3. Search Book by ID

4. Display All Books

5. Exit

Enter your choice: 1

Enter Book ID: 101

Enter Title: java

Enter Author: james gosling

Book added: java

Library System Menu:

1. Add Book

2. Remove Book

3. Search Book by ID

4. Display All Books

5. Exit

Enter your choice:

SOLUTION 2

import java.util.Scanner;  
  
// Define the Taxable interface  
interface Taxable {  
 double *SALES\_TAX* = 7.0; // 7% Sales Tax  
 double *INCOME\_TAX* = 10.5; // 10.5% Income Tax  
  
 // Abstract method to calculate tax  
 double calcTax();  
}  
  
// Employee class implementing the Taxable interface  
class Employee implements Taxable {  
 private int empId;  
 private String name;  
 private double salary;  
  
 // Constructor  
 public Employee(int empId, String name, double salary) {  
 this.empId = empId;  
 this.name = name;  
 this.salary = salary;  
 }  
  
 // Implement the calcTax method to calculate income tax  
 @Override  
 public double calcTax() {  
 return (salary \* *INCOME\_TAX*) / 100;  
 }  
  
 // Getter methods  
 public int getEmpId() {  
 return empId;  
 }  
  
 public String getName() {  
 return name;  
 }  
  
 public double getSalary() {  
 return salary;  
 }  
}  
  
// Product class implementing the Taxable interface  
class Product implements Taxable {  
 private int pid;  
 private double price;  
 private int quantity;  
  
 // Constructor  
 public Product(int pid, double price, int quantity) {  
 this.pid = pid;  
 this.price = price;  
 this.quantity = quantity;  
 }  
  
 // Implement the calcTax method to calculate sales tax  
 @Override  
 public double calcTax() {  
 double totalPrice = price \* quantity;  
 return (totalPrice \* *SALES\_TAX*) / 100;  
 }  
  
 // Getter methods  
 public int getPid() {  
 return pid;  
 }  
  
 public double getPrice() {  
 return price;  
 }  
  
 public int getQuantity() {  
 return quantity;  
 }  
}

import java.util.Scanner;  
  
public class DriverMain {  
 public static void main(String[] args) {  
 Scanner scanner = new Scanner(System.*in*);  
  
 // Input employee information  
 System.*out*.print("Enter Employee ID: ");  
 int empId = scanner.nextInt();  
 scanner.nextLine(); // Consume newline character  
 System.*out*.print("Enter Employee Name: ");  
 String name = scanner.nextLine();  
 System.*out*.print("Enter Employee Salary: ");  
 double salary = scanner.nextDouble();  
  
 // Create Employee object  
 Employee employee = new Employee(empId, name, salary);  
  
 // Input product information  
 System.*out*.print("Enter Product ID: ");  
 int pid = scanner.nextInt();  
 System.*out*.print("Enter Product Price: ");  
 double price = scanner.nextDouble();  
 System.*out*.print("Enter Product Quantity: ");  
 int quantity = scanner.nextInt();  
  
 // Create Product object  
 Product product = new Product(pid, price, quantity);  
  
 // Calculate and display income tax and sales tax  
 double incomeTax = employee.calcTax();  
 double salesTax = product.calcTax();  
  
 // Display employee information and income tax  
 System.*out*.println("\nEmployee Info:");  
 System.*out*.println("Employee ID: " + employee.getEmpId());  
 System.*out*.println("Employee Name: " + employee.getName());  
 System.*out*.println("Yearly Salary: " + employee.getSalary());  
 System.*out*.println("Income Tax: " + incomeTax);  
  
 // Display product information and sales tax  
 System.*out*.println("\nProduct Info:");  
 System.*out*.println("Product ID: " + product.getPid());  
 System.*out*.println("Product Price: " + product.getPrice());  
 System.*out*.println("Product Quantity: " + product.getQuantity());  
 System.*out*.println("Sales Tax: " + salesTax);  
  
 scanner.close();  
 }  
}

OUTPUT

Enter Employee ID: 101

Enter Employee Name: sam

Enter Employee Salary: 500000

Enter Product ID: 12

Enter Product Price: 3000

Enter Product Quantity: 3

Employee Info:

Employee ID: 101

Employee Name: sam

Yearly Salary: 500000.0

Income Tax: 52500.0

Product Info:

Product ID: 12

Product Price: 3000.0

Product Quantity: 3

Sales Tax: 630.0

Process finished with exit code 0