Abbottabad Campus

Department of Computer Science

TERMINAL EXAMINATION – Spring 2024

Class: BCS-3A
Subject: Object-Oriented Programming
Total Time Allowed: 3 hours
Name: M. Khan

Date: 15 July 2024
Instructor: Dr. Abdul Nasir Khan
Max Marks: 100
Registration # SP23-BCS-166

SECTION-A (Marks: 100)

Question #1) **CLO-1 (C2)** **Marks: 30**

a. What is the difference between abstract class and concrete class?
b. Write three uses of the final keywords.
c. What is the difference between upcasting and downcasting? Explain with an example.
d. What is the difference between multiple inheritance and multilevel inheritance?
e. What is the difference between AWT and swing?
f. Write a statement where a newly created class, ClassA, implements Interface1 and Interface2, and inherits from ClassB. Assume all classes and interfaces are already defined.

Question #2) **CLO-2 (C6)** **Marks: 30 Marks**

Write flexible JAVA application for managing various library items while leveraging object-oriented principles such as inheritance and polymorphism to maintain clarity and efficiency in the software system. The system contains the following classes:

- **LibraryItem Class:**
  - Attributes:
    - itemId: Unique identifier for each library item.
    - title: Title of the library item.
    - checkedOut: Boolean flag indicating if the item is currently checked out.
  - Methods:
    - checkout(): Marks the item as checked out.
    - returnItem(): Marks the item as returned.
    - displayDetails(): Displays all details of the library item.
- **Book Class (Derived from LibraryItem):**
  - Additional Attributes:
    - author: Author of the book.
    - isbn: ISBN number of the book.
  - Methods:
    - Override displayDetails(): Displays book-specific details along with inherited details from LibraryItem.
- **DVD Class (Derived from LibraryItem):**
  - Additional Attributes:
    - director: Director of the DVD.
    - duration: Duration of the DVD in minutes.
  - Methods:
    - Override displayDetails(): Displays DVD-specific details along with inherited details from LibraryItem.
- **Journal Class (Derived from LibraryItem):**
  - Additional Attributes:
    - journalId: Identifier specific to journals.
    - publisher: Publisher of the journal.

CamScanner

- Override displayDetails(): Displays journal-specific details along with inherited details from LibraryItem.

- **Library Class (Main Class):**
  - Attributes:
    - items: An ArrayList to store instances of LibraryItem.
  - Methods:
    - addItem(item): Adds a LibraryItem object to the items list.
    - checkoutItem(itemId): Marks the item with itemId as checked out.
    - returnItem(itemId): Marks the item with itemId as returned.
    - displayItemDetails(itemId): Displays details of the item with itemId.
    - displayAllItems(): Displays details of all items in the library.

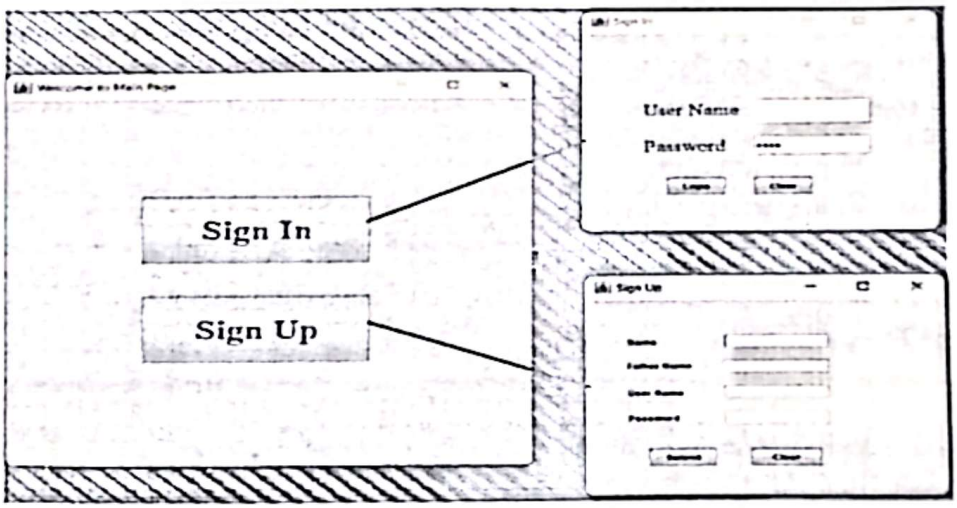
public class

Implementation Notes:

- Each class (LibraryItem, Book, DVD, Journal) should appropriately encapsulate its attributes and provide necessary accessor and mutator methods.
- Polymorphism is utilized through method overriding (displayDetails() method in derived classes) to display specific details based on the type of library item.
- An ArrayList (items) in the Library class is used to manage a dynamic collection of library items, allowing for easy addition, removal, and retrieval of items.
- Create TestLibarary class to test the functionalities of the Library class.

Question #3) **CLO-3 (C3)** **Marks: 40**

Write Java code to create the following three frames shown in the figure.



When the program is executed, the main frame displays two buttons labeled "Sign In" and "Sign Up".

- Clicking the "Sign Up" button opens a signup frame on the screen, as depicted in the diagram. This frame includes four labels, four textfields, and two buttons labeled "Submit" and "Clear".
  - Upon clicking the "Submit" button after entering information into the textfields, the data is saved in a file named "login.txt", provided the username does not already exist in the file. If a username already exists, a message "An account with the same username already exists. Please choose another username." will be displayed.
  - Clicking the "Clear" button clears all text from the textfields.
- Clicking the "Sign In" button on the main frame displays a signin frame on the screen, as shown in the diagram. This frame includes two labels, two textfields, and two buttons labeled "Login" and "Clear".
  - Clicking the "Login" button after entering a username and password searches the "login.txt" file. If the username and password are found in the file, a "Login Successful" message is displayed; otherwise, a "Login Failed" message appears on

CamScanner