

CSE 108
Online on Java Inheritance and Interfaces
Section: A1+A2
Date: June 23, 2025
Time: 40 Minutes

Problem Statement

Design a flexible payment-processing framework in Java that supports multiple payment types:

- Credit cards
- PayPal accounts
- Bkash mobile wallets

You have to demonstrate **inheritance** and **interfaces** by:

1. Defining a common **interface** `PaymentGateway` with methods for processing payments and refunds
2. Creating an **abstract base class** `AbstractPayment` to hold shared data (e.g., account ID, last transaction) and declare a validation hook
3. Implementing concrete subclasses (`CreditCardPayment`, `PayPalPayment`, `BkashPayment`) that extend the abstract base and implement the interface

Functionality & Workflow

1. The system must process a fixed payment amount (e.g., \$200.00) through each available gateway.
2. Each gateway performs its own `validateDetails()` logic before charging. Invalid credentials should abort that transaction.
3. For successful payments, record the transaction and then issue a partial refund (e.g., \$50.00).
4. Main must handle all gateways **polymorphically** via the `PaymentGateway` interface and, when needed, cast back to `AbstractPayment` to retrieve shared state (e.g., last transaction amount).

Classes to Implement

- **PaymentGateway (interface):**
 - `boolean processPayment(double amount)`
 - `default boolean refund(double amount)` (provides a refund implementation)
- **AbstractPayment (abstract class) – add appropriate Access Modifiers:**
 - Fields: `String accountIdIdentifier; double lastTransactionAmount;`
 - Constructor to set `accountIdIdentifier`
 - `void recordTransaction(double amount)`
 - `abstract boolean validateDetails()`
- **Concrete subclasses:**
 - `CreditCardPayment` (validate: 16-digit number)
 - `PayPalPayment` (validate: contains @)
 - `BkashPayment` (validate: 11-digit mobile number starting with '01')

Main Method & Testing

[Here is the Main class](#) that you should use to test your implementations. **Make no modification** to this code.

Submission Guidelines

- Create a folder named by your ID.
- Move all .java files in the folder.
- Zip the folder and submit the zip file.