

Java Exercise Sheet: Polymorphism, Abstract Classes & Interfaces

Exercise 1: Smart Devices

Task:

- Create a base class `SmartDevice` with a method `performFunction()`.
- Extend it with `LightBulb`, `Thermostat`, and `SecurityCamera`.
- Override the method in each class.

Expected Output:

```
LightBulb is lighting up.  
Thermostat is adjusting temperature.  
SecurityCamera is monitoring home.
```

Exercise 2: Payment Gateways

Task:

- Create an abstract class `PaymentGateway` with:
 - Abstract method `processPayment()`
 - Regular method `authenticateUser()` that prints: "User authenticated."
- Extend it with `PayPal` and `CreditCard` classes.

Expected Output:

```
User authenticated.  
Processing payment via PayPal...  
User authenticated.  
Processing payment via Credit Card...
```

Exercise 3: Media Players

Task:

- Create interface `MediaPlayer` with method `play()`.
- Implement it in `MusicPlayer` and `VideoPlayer`.

Expected Output:

```
Playing music...  
Playing video...
```

Exercise 4: Smart Kitchen Appliance

Task:

- Create two interfaces: `Cookable` and `Washable`.
- Implement both in `SmartOven` class.

Expected Output:

```
Cooking food...  
Washing utensils...
```

Exercise 5: Travel Booking System**Task:**

- **Interface:** `BookingPlatform` with method `bookTicket()`.
- **Classes:** `TrainBooking`, `FlightBooking`, `BusBooking` implement the interface.
- Iterate over them in a loop and call `bookTicket()`.

Expected Output:

```
Booking train ticket...  
Booking flight ticket...  
Booking bus ticket...
```