Java Assignments on Abstract Class, Interface, and Final Keyword

# Assignment 1: Abstract Class - Animal Kingdom

Objective: Use an abstract class with abstract and concrete methods.

Task:

* Create an abstract class `Animal` with an abstract method `makeSound()` and a concrete method `breathe()`.
* Derive classes `Dog` and `Cat` from `Animal` and implement `makeSound()`.
* Demonstrate both methods using objects in the main method.

# Assignment 2: Interface - Payment Gateway

Objective: Implement an interface to model a payment system.

Task:

* Create an interface `PaymentGateway` with methods `pay()` and `refund()`.
* Implement classes `CreditCardPayment` and `UPIPayment` that implement this interface.
* Demonstrate their behavior using the interface reference.

# Assignment 3: Interface + Abstract Class - Vehicle System

Objective: Use both interface and abstract class together.

Task:

* Create an interface `PollutionControl` with method `checkEmission()`.
* Create an abstract class `Vehicle` with a concrete method `start()` and abstract method `fuelType()`.
* Derive classes `Car` and `Bike` which implement `PollutionControl` and extend `Vehicle`.
* Demonstrate their functionality in the main method.

# Assignment 4: Final Class - University Management

Objective: Demonstrate use of final class to restrict inheritance.

Task:

* Create a final class `University` with fields like name and location.
* Try to extend this class in another class `PrivateUniversity` and observe the compilation error.
* Document your observations with explanation.

# Assignment 5: Final Method - Banking System

Objective: Prevent method overriding using final keyword.

Task:

* Create a base class `BankAccount` with a final method `generateAccountNumber()`.
* Create a subclass `SavingsAccount` and attempt to override `generateAccountNumber()`.
* Show the compiler error and explain final method restriction.

# Assignment 6: Multiple Interfaces - Smart Home Devices

Objective: Demonstrate multiple interface implementation.

Task:

* Create two interfaces `Switchable` and `Configurable` with relevant methods.
* Implement a class `SmartBulb` that implements both.
* Write a driver class to demonstrate calling of implemented methods.

# Assignment 7: Abstract Class vs Interface - Online Learning Platform

Objective: Compare abstract class and interface.

Task:

* Create an abstract class `User` with a method `login()`.
* Create an interface `CourseContent` with a method `accessContent()`.
* Create a class `Student` that extends `User` and implements `CourseContent`.
* Implement both methods and discuss the difference in usage.

# Assignment 8: Interface Inheritance - Musical Instruments

Objective: Interface inheritance and polymorphism.

Task:

* Create an interface `Instrument` with method `play()`.
* Create another interface `StringInstrument` that extends `Instrument` and adds method `tuneStrings()`.
* Implement both in class `Guitar`.
* Demonstrate interface inheritance and polymorphism in the main method.