Real-World Example of Hybrid Inheritance in C#

# 🚀 Scenario: Banking System

We want to model a simple banking system where:  
- Account is a base class (general properties for all accounts).  
- SavingsAccount inherits from Account.  
- LoanAccount inherits from Account.  
- ITransaction is an interface with transaction behavior.  
- CustomerAccount inherits from SavingsAccount and also implements ITransaction (this is where hybrid inheritance comes in).

# ✅ Code Example

// Base class  
public class Account  
{  
 public string AccountNumber { get; set; }  
  
 public void ShowAccountInfo()  
 {  
 Console.WriteLine($"Account Number: {AccountNumber}");  
 }  
}  
  
// Derived class (Multilevel Inheritance)  
public class SavingsAccount : Account  
{  
 public double InterestRate { get; set; }  
  
 public void CalculateInterest()  
 {  
 Console.WriteLine($"Interest calculated at rate: {InterestRate}%");  
 }  
}  
  
// Another base for hybrid (Interface)  
public interface ITransaction  
{  
 void Deposit(double amount);  
 void Withdraw(double amount);  
}  
  
// Hybrid derived class  
public class CustomerAccount : SavingsAccount, ITransaction  
{  
 private double balance = 0;  
  
 public void Deposit(double amount)  
 {  
 balance += amount;  
 Console.WriteLine($"Deposited: {amount}, New Balance: {balance}");  
 }  
  
 public void Withdraw(double amount)  
 {  
 if (balance >= amount)  
 {  
 balance -= amount;  
 Console.WriteLine($"Withdrawn: {amount}, Remaining Balance: {balance}");  
 }  
 else  
 {  
 Console.WriteLine("Insufficient funds.");  
 }  
 }  
}

# 🎯 Usage Example

class Program  
{  
 static void Main()  
 {  
 CustomerAccount customer = new CustomerAccount();  
 customer.AccountNumber = "ACC123456";  
 customer.InterestRate = 5.0;  
  
 customer.ShowAccountInfo(); // From Account class  
 customer.CalculateInterest(); // From SavingsAccount  
 customer.Deposit(1000); // From ITransaction  
 customer.Withdraw(400); // From ITransaction  
 }  
}

# 🧠 Summary

This example demonstrates hybrid inheritance:  
- Multilevel inheritance: Account → SavingsAccount → CustomerAccount  
- Multiple inheritance via interface: CustomerAccount implements ITransaction  
  
C# avoids multiple class inheritance to prevent ambiguity, but hybrid inheritance is achievable using interfaces and class inheritance combined.