

by Kunal Sir

INHERITANCE Assignment

1. SINGLE INHERITANCE (Parent → Child)

Q1. Vehicle → Car Management System

A transport company maintains basic vehicle information.

Vehicle has: registration number, manufacturer, base price.

Car adds: fuel type and number of seats.

Task:

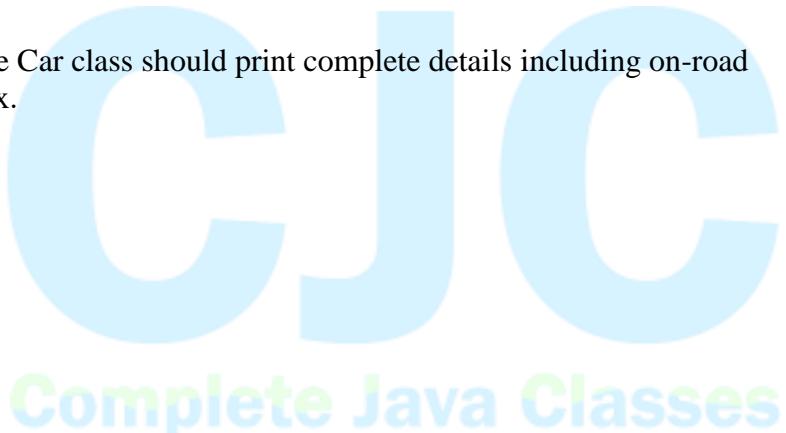
Create classes `Vehicle` and `Car`. The `Car` class should print complete details including on-road price = base price + ₹15,000 road tax.

✓ Sample Input

Car
MH12AB1234
Tata Motors
550000
Petrol
5

✓ Sample Output

Registration: MH12AB1234
Manufacturer: Tata Motors
Base Price: 550000
Fuel Type: Petrol
Seats: 5
On-Road Price: 565000



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Q2. BankAccount → SavingsAccount

BankAccount: account number, holder name, balance

SavingsAccount: interestRate, method applyInterest()

Apply interest:

```
newBalance = balance + (balance * rate / 100)
```

✓ Sample Input

```
SavingsAccount  
Account No: 12345  
Name: Rohan  
Balance: 10000  
Interest Rate: 5
```

✓ Sample Output

```
Before Interest: 10000  
After Interest: 10500
```

Q3. Employee → Manager Salary Calculation

Employee: id, name, baseSalary

Manager: teamAllowance, overridden calculateSalary()

✓ Sample Input

```
Manager  
ID: 101  
Name: Meera  
Base Salary: 50000  
Team Allowance: 8000
```

✓ Sample Output

```
Employee ID: 101  
Name: Meera  
Final Salary: 58000
```

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Q4. Product → ElectronicProduct Billing

Product: brand, price

ElectronicProduct: warrantyYears, finalPrice = price + warrantyYears*500

✓ Sample Input

ElectronicProduct

Brand: Samsung

Price: 20000

Warranty: 2 years

✓ Sample Output

Brand: Samsung

Base Price: 20000

Warranty Years: 2

Final Price: 21000



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2. MULTILEVEL INHERITANCE (Grandparent → Parent → Child)

Q1. Person → Employee → Manager

Person: name, age

Employee: empId, department

Manager: team size

✓ Sample Input

Manager

Name: Aarav

Age: 32

Emp ID: E102

Department: IT

Team Size: 12

✓ Sample Output

Name: Aarav

Age: 32

Employee ID: E102

Department: IT

Team Size: 12

Q2. Animal → Mammal → Dog



The logo features a stylized globe on the left, colored in green and blue. To the right of the globe, the letters 'CJC' are written in a large, bold, light blue font. Below 'CJC', the words 'Complete Java Classes' are written in a smaller, light blue font.

Animal: eat(), sleep()

Mammal: warm-blooded info

Dog: bark()

✓ Sample Input

Dog

Action: Details

✓ Sample Output

Animal: Eats food

Animal: Sleeps

Mammal: Warm-blooded creature

Dog: Barks loudly

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Q3. Device → Computer → Laptop

Device: serialNo

Computer: processor, RAM

Laptop: batteryBackup

✓ Sample Input

Laptop

Serial: D1001

Processor: i5

RAM: 8GB

Battery: 6 Hours

✓ Sample Output

Serial No: D1001

Processor: i5

RAM: 8GB

Battery Backup: 6 Hours

Q4. Course → OnlineCourse → SelfPacedCourse

Course: title, duration

OnlineCourse: platform

SelfPacedCourse: access validity

✓ Sample Input

SelfPacedCourse

Title: Java Basics

Duration: 30 Days

Platform: Udemy

Access Validity: 1 Year

✓ Sample Output

Course: Java Basics

Duration: 30 Days

Platform: Udemy

Access Validity: 1 Year

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3. HIERARCHICAL INHERITANCE (One Parent → Many Children)

Q1. Shape → Circle, Rectangle, Triangle

Shape: color

Each child writes its own draw() method to show shape-specific details.

✓ Sample Input

Circle
Color: Red
Radius: 5

✓ Sample Output

Drawing Circle
Color: Red
Radius: 5
Area: 78.5

Q2. Vehicle → Car, Bike, Truck

Vehicle: brand

Car: seats

Bike: mileage

Truck: loadCapacity

✓ Sample Input

Truck
Brand: Ashok Leyland
Load Capacity: 12000 kg

✓ Sample Output

Vehicle Type: Truck
Brand: Ashok Leyland
Load Capacity: 12000 kg

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Q3. Media → Book, Movie, Song

Media: title, year

Book, Movie, Song: Child adds its own fields.

✓ Sample Input

```
Movie
Title: Inception
Year: 2010
Director: Christopher Nolan
```

✓ Sample Output

```
Media Type: Movie
Title: Inception
Year: 2010
Director: Christopher Nolan
```

Q4. Payment → UPI, CreditCard, Cash

Payment: amount

UPI, CreditCard, Cash: Each child class writes its own processPayment() method according to its payment type.

✓ Sample Input

```
UPI
Amount: 250
UPI ID: rohan@oksbi
```

✓ Sample Output

```
Processing UPI Payment
Amount: 250
Paid via: rohan@oksbi
Payment Successful
```

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Q1. University Management System (Multilevel + Hierarchical)

A university needs a class structure to manage different roles of people.

Person (base class)

- name, age

Employee extends Person (single inheritance)

- employeeId, department

TeachingStaff extends Employee (multilevel inheritance)

- subject, timetable

NonTeachingStaff extends Employee (hierarchical inheritance)

- duty, shift

Student extends Person (hierarchical inheritance)

- rollNo, course

Problem:

Design the inheritance structure so that:

- Person → Employee → TeachingStaff forms **multilevel inheritance**
- Employee → TeachingStaff and Employee → NonTeachingStaff form **hierarchical inheritance**
- Person → Student is **single inheritance**

Create a method **getDetails()** in every class and show how inheritance reduces code duplication.

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Q2. Hospital Management (Single + Multilevel + Hierarchical)

A hospital wants to classify its working structure.

HospitalMember

- id, name

Doctor extends HospitalMember (single inheritance)

- specialization

Surgeon extends Doctor (multilevel inheritance)

- surgeryType

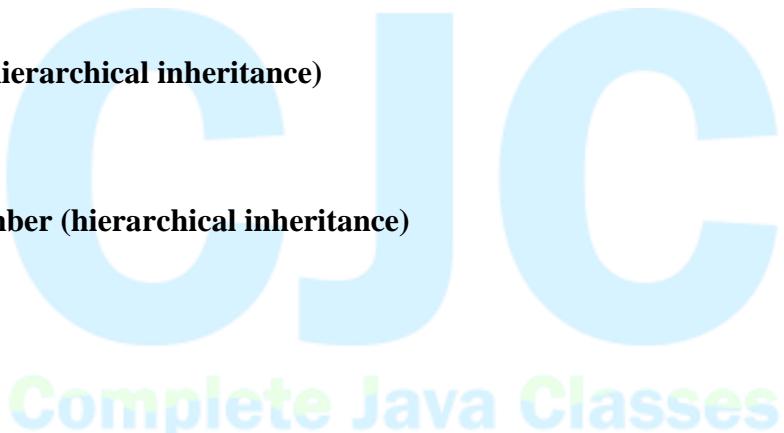
Nurse extends HospitalMember (hierarchical inheritance)

- wardAssigned

Receptionist extends HospitalMember (hierarchical inheritance)

- deskNumber

Problem:



Build the above hierarchy where:

- HospitalMember → Doctor → Surgeon forms a **multilevel** chain
- HospitalMember → Nurse and HospitalMember → Receptionist form **hierarchical inheritance**

Demonstrate method overriding of **performDuty()** for each role.

Q3. Automobile Manufacturing (Single + Hierarchical + Multilevel)

An automobile company needs to model its vehicle categories.

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Vehicle

- brand, model

Car extends Vehicle (single inheritance)

- numberOfDoors

SUV extends Car (multilevel inheritance)

- groundClearance

Truck extends Vehicle (hierarchical inheritance)

- loadCapacity

SportsCar extends Car (hierarchical inheritance)

- topSpeed

Problem:

Create the class model such that:

- Vehicle → Car → SUV forms **multilevel inheritance**
- Vehicle → Truck and Vehicle → Car form **hierarchical inheritance**
- Car extends Vehicle is **single inheritance**

Implement a method **vehicleInfo()** in all classes to show specialization increasing at each level.

Q4. E-Commerce Product Catalog (Multilevel + Hierarchical + Single)

An e-commerce platform wants to organize products.

Product

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- id, name

Electronics extends Product (single inheritance)

- warranty

MobilePhone extends Electronics (multilevel inheritance)

- cameraQuality

Laptop extends Electronics (hierarchical inheritance)

- processor

Clothing extends Product (hierarchical inheritance)

- size, fabric

Problem:

Model the platform so that:

- Product → Electronics → MobilePhone forms **multilevel inheritance**
- Product → Electronics and Product → Clothing form **hierarchical inheritance**
- Electronics extends Product is **single inheritance**

Create a method `display()` in every class.

Each subclass should show its own extra information along with the details it inherits from its parent class.