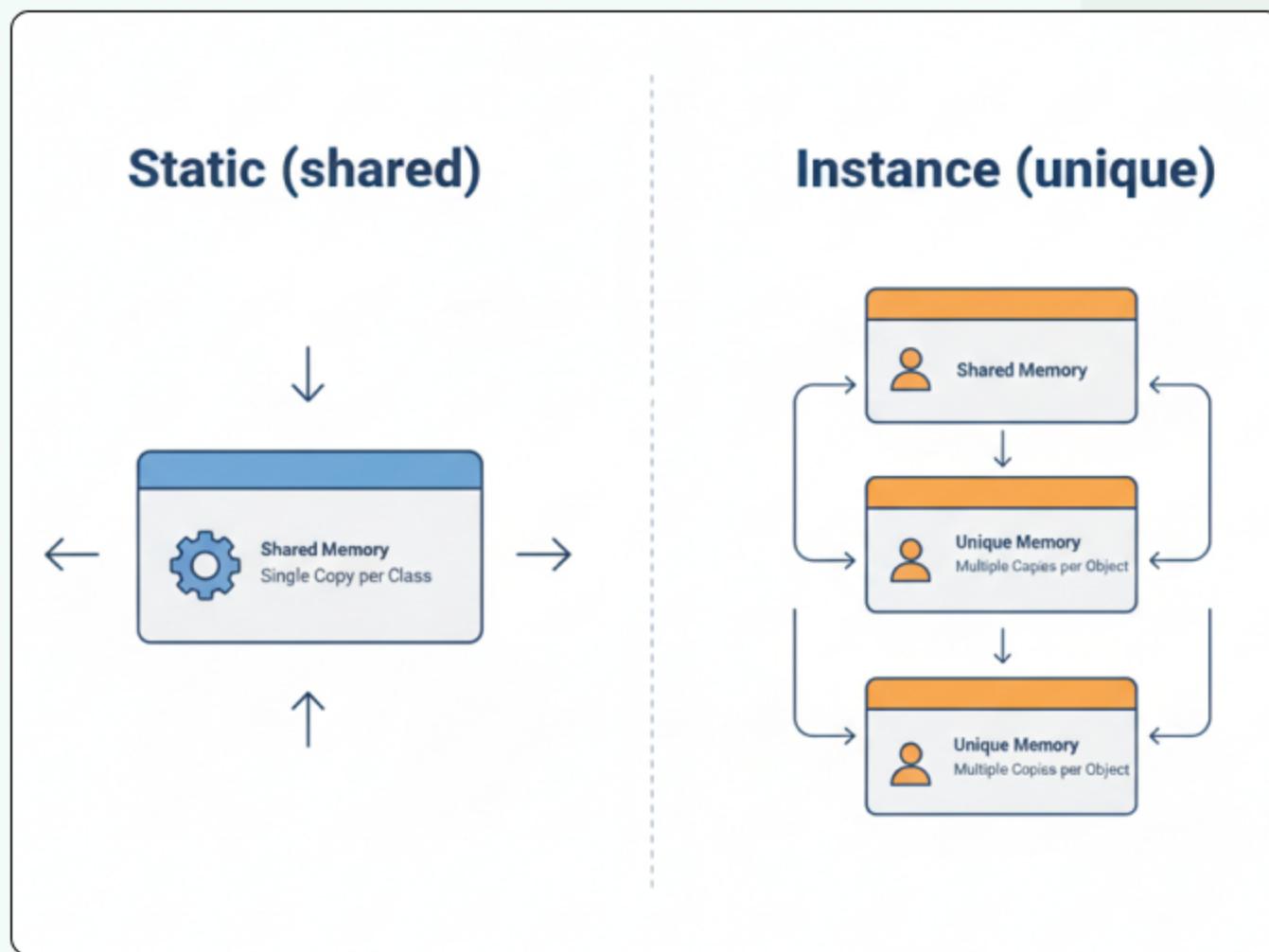




# Static vs Instance in Java: The Real Difference Explained

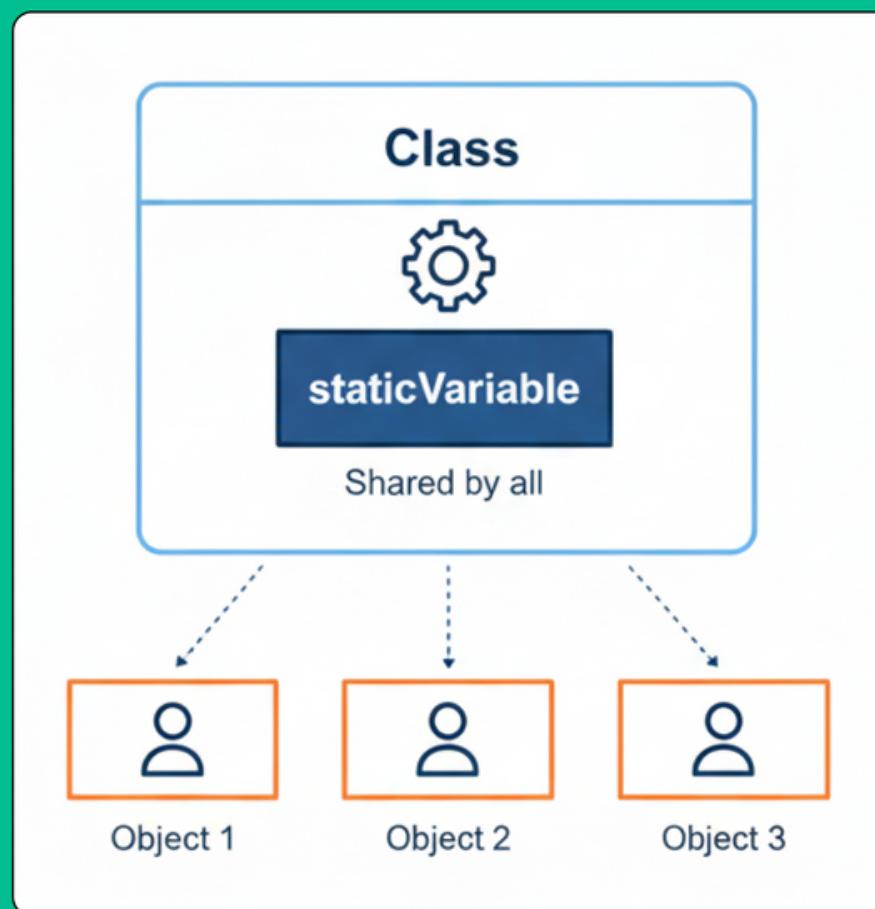


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## What Does Static Mean?

- Belongs to the **class**, not to any specific object.
- Shared across all objects of that class.
- Can be accessed **without creating an instance**.

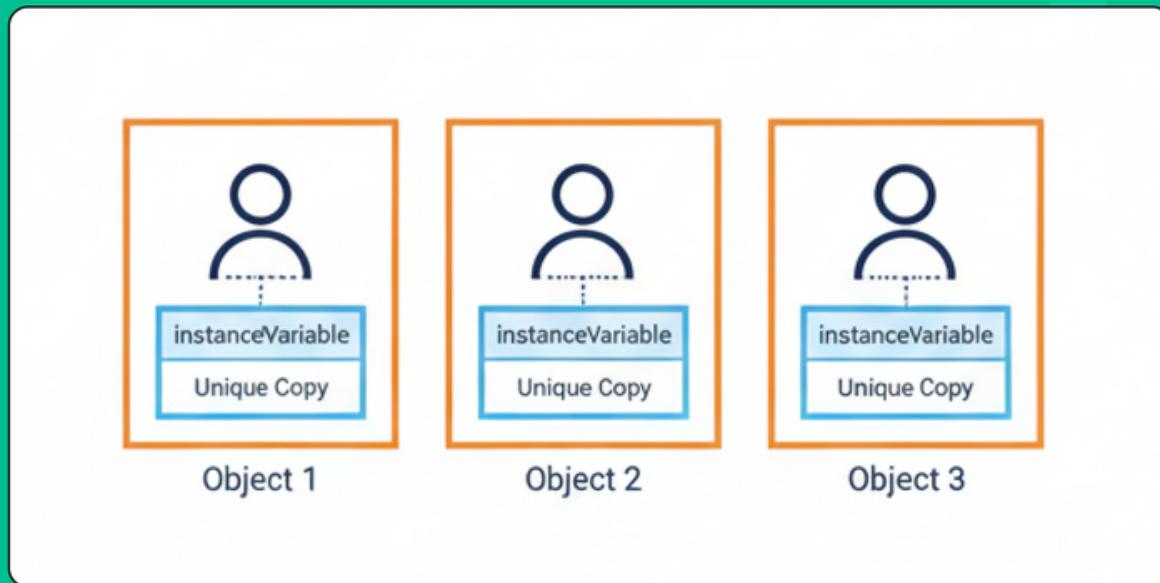


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## What Does Instance Mean?

- Belongs to a **specific object** of a class.
- Each object has its own **copy** of the variable.
- Needs an instance to be accessed.



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## Static Variables vs Instance Variables

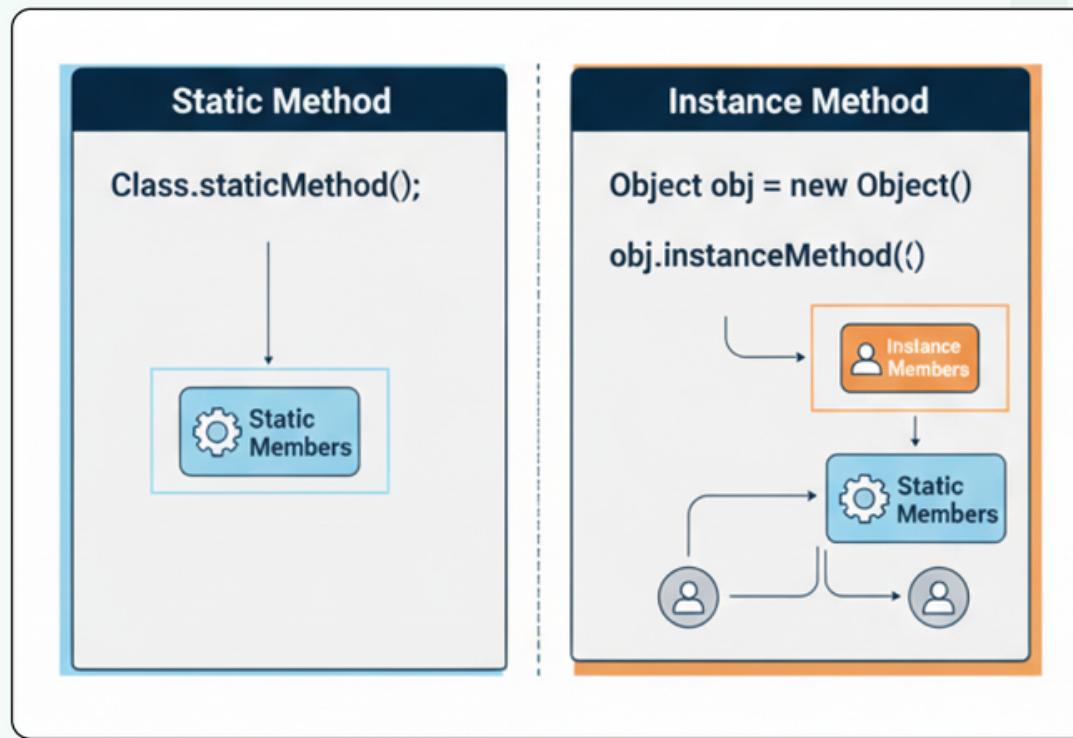
Feature	Static Variable	Instance Variable
Memory	 Shared Memory	 Unique Memory
	Shared	Unique per object
Access	Class name	Object reference
Lifetime	Till class unloads	Till object destroyed

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## Static Methods vs Instance Methods

- **Static methods** → Access only static members, called using class name.
- **Instance methods** → Can access both static and instance members.



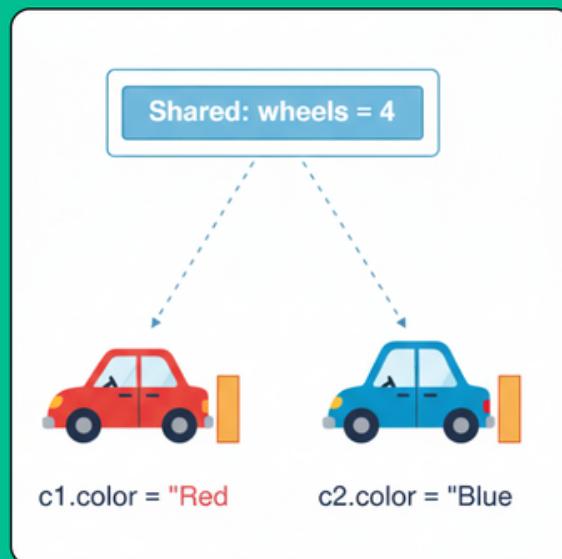
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## Example in Action

```
class Car {  
    static int wheels = 4;  
    String color;  
}  
Car c1 = new Car();  
Car c2 = new Car();  
c1.color = "Red";  
c2.color = "Blue";
```

**Here, `wheels` is shared, but each car has its own color.**

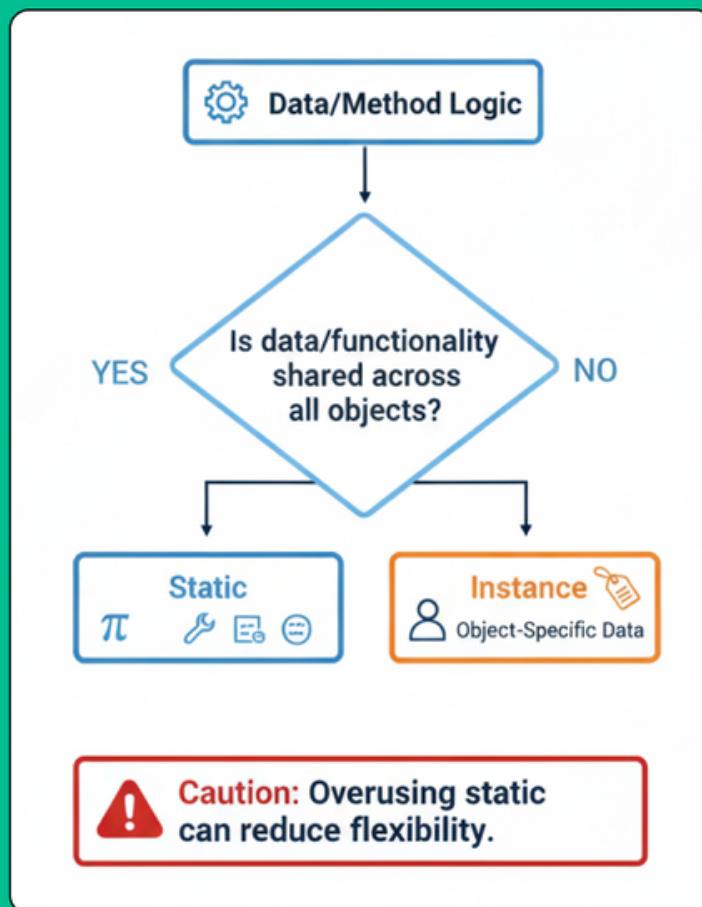


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## When to Use Each

- Use **static** for constants, utility methods, counters.
- Use **instance** for object-specific data.
- Don't overuse static – it can make code less flexible.



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## Common Mistakes

- Accessing instance data from a static method (not allowed).
- Overusing static variables → makes testing difficult.
- Confusing shared and object-specific state.

### Error: Static Method Accessing Instance Data

```
in static
    ! System..println(instanceVariable);
}
    Cannot make a static reference
    to non-static field instanceVariable

public static void staticMethod();
}
```



Confusing shared vs. unique state leads to bugs.

### Problem: Overused Static

```
static int counter = 0; ...
...
Cloud icon: Difficult to test in parallel( ...
```

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## Interview Prep Q&A

### Q1: What's the main difference between static and instance members?

A1: Static belongs to the class; instance belongs to objects.

### Q2: Can static methods access instance variables?

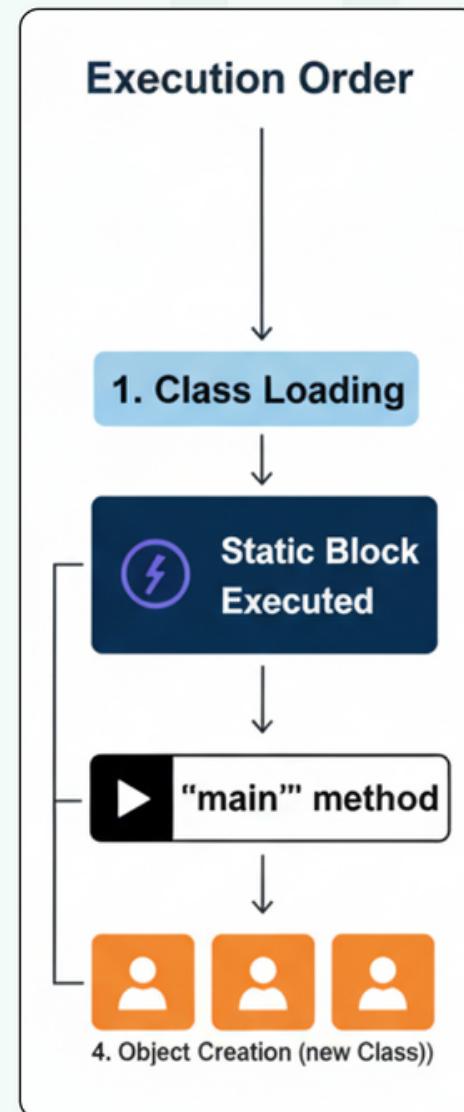
A2: No, because they don't have an associated object.

### Q3: When is a static block executed?

A3: When the class is loaded into memory, before main().

### Q4: Why are static variables memory efficient?

A4: Because only one copy exists regardless of object count.



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