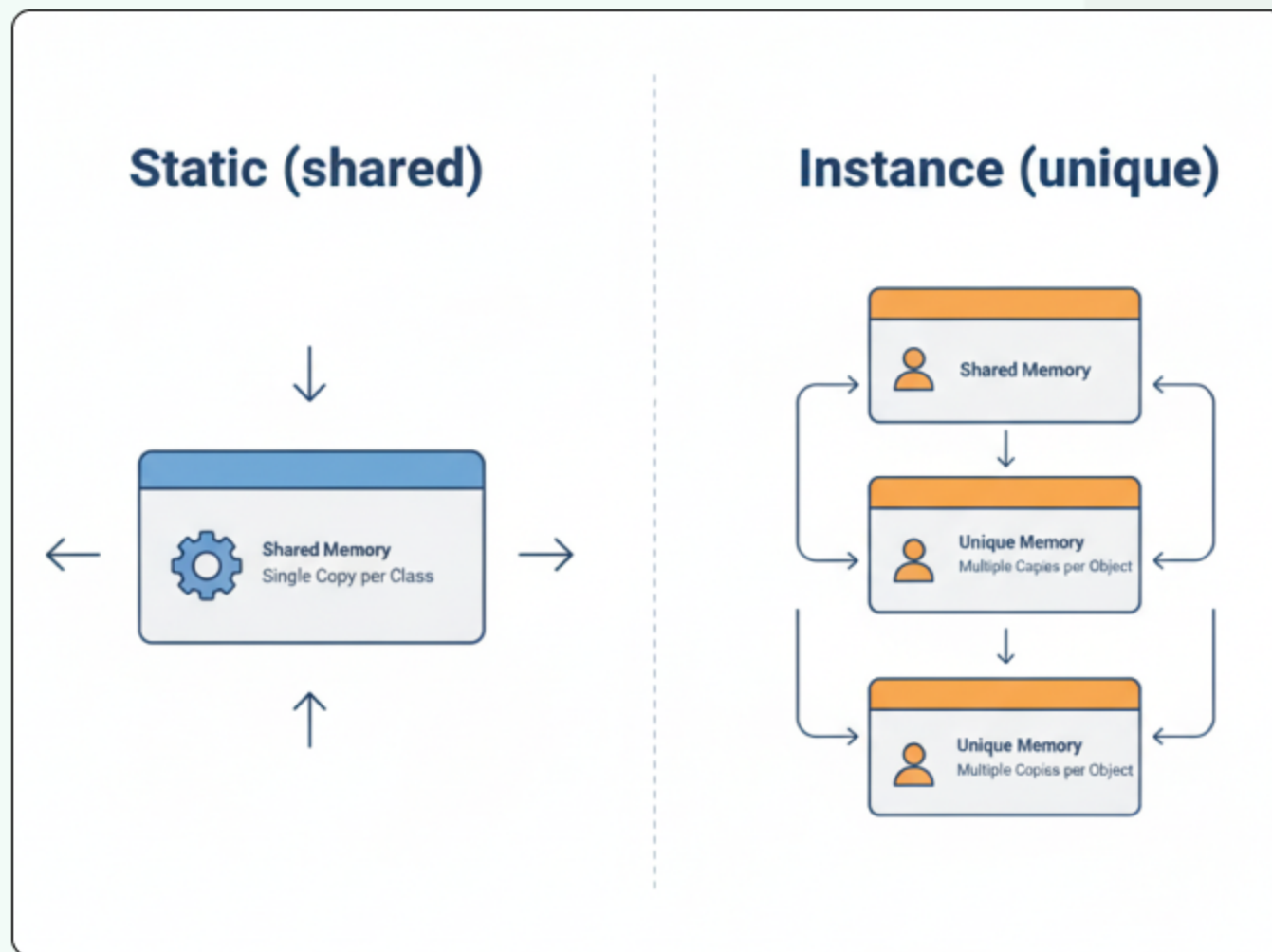




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# Static vs Instance in Java: The Real Difference Explained

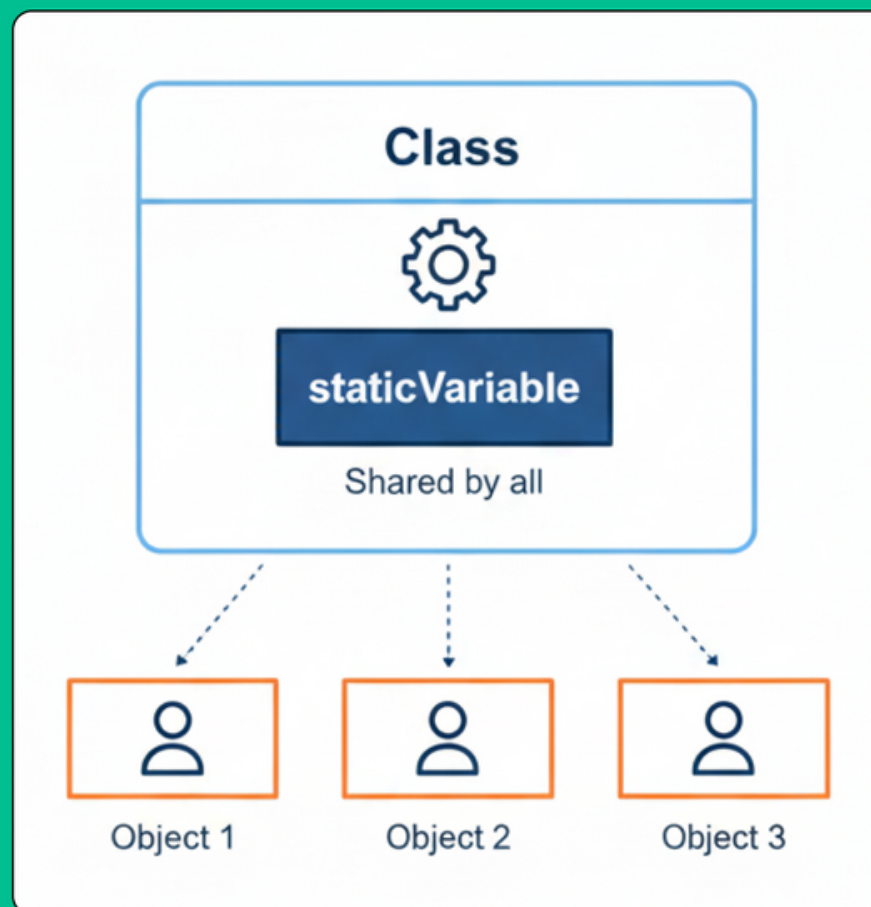




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# What Does Static Mean?

- 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	Unique per object
Access	Class name	Object reference
Lifetime	Till class unloads	Till object destroyed



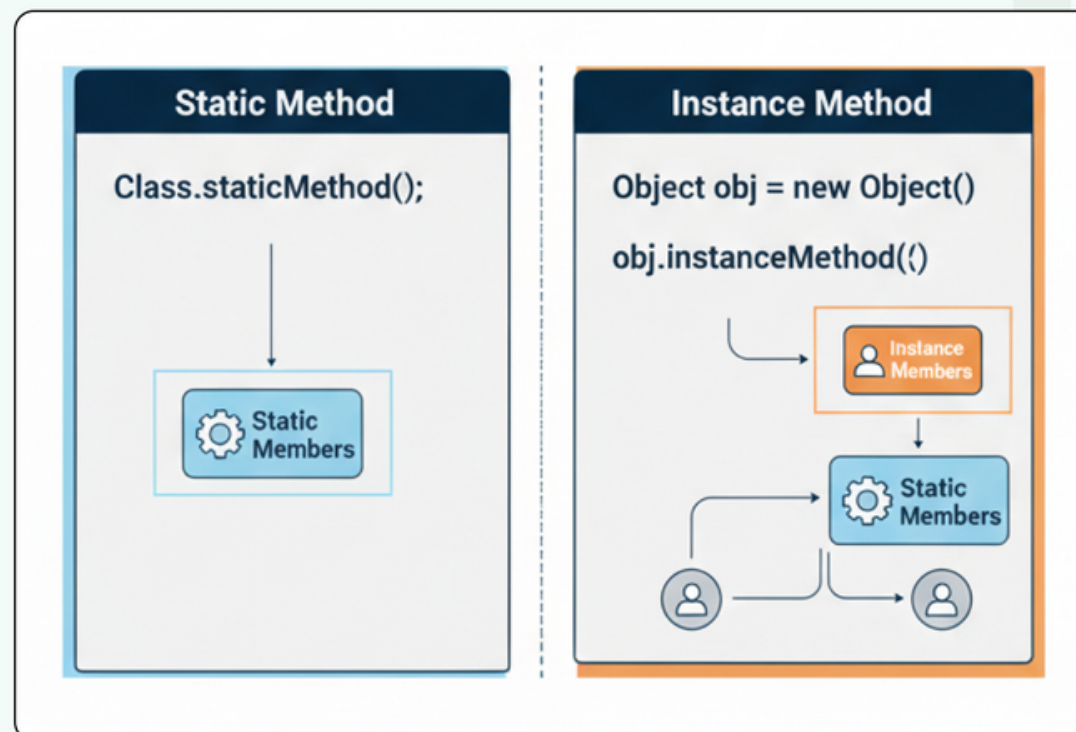




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# Static Methods vs Instance Methods

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



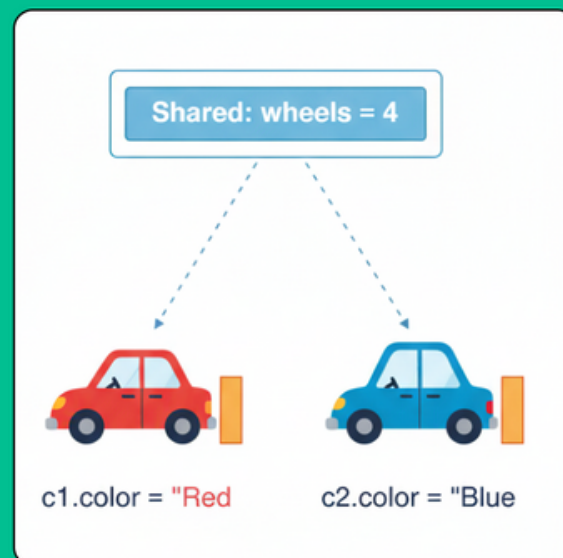


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## Example in Action

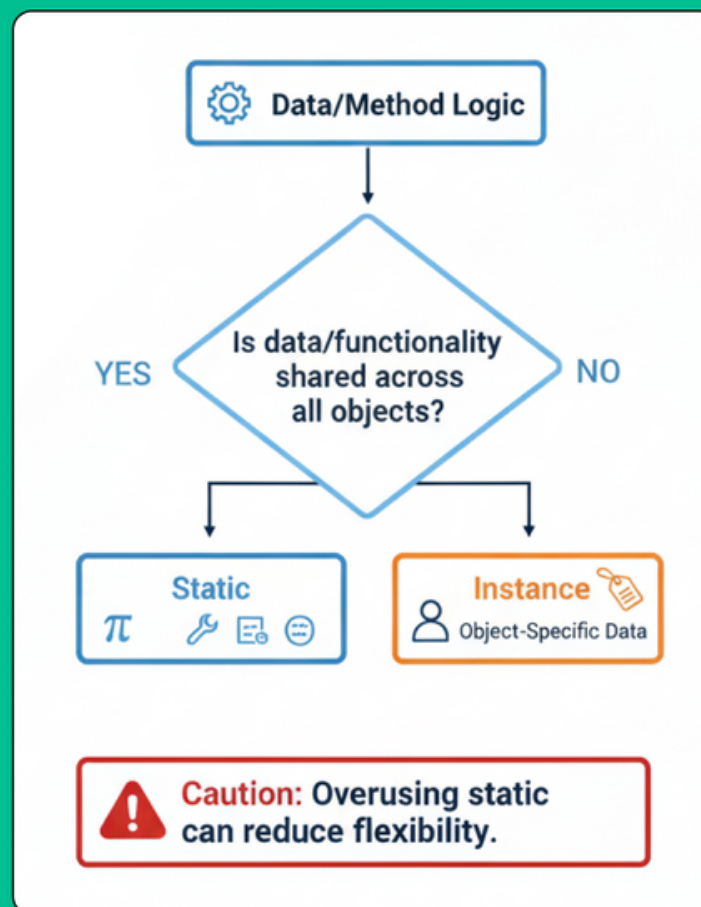
```
class Car {  
  static int wheels = 4;  
  String color;  
}  
Car c1 = new Car();  
Car c2 = new Car();  
c1.color = "Red";  
c2.color = "Blue";
```

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



# 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();  
}
```

### Problem: Overused Static

```
static int counter = 0; ...
```



Difficult to test in parallel( ...



Confusing shared vs. unique state leads to bugs.





# 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?**

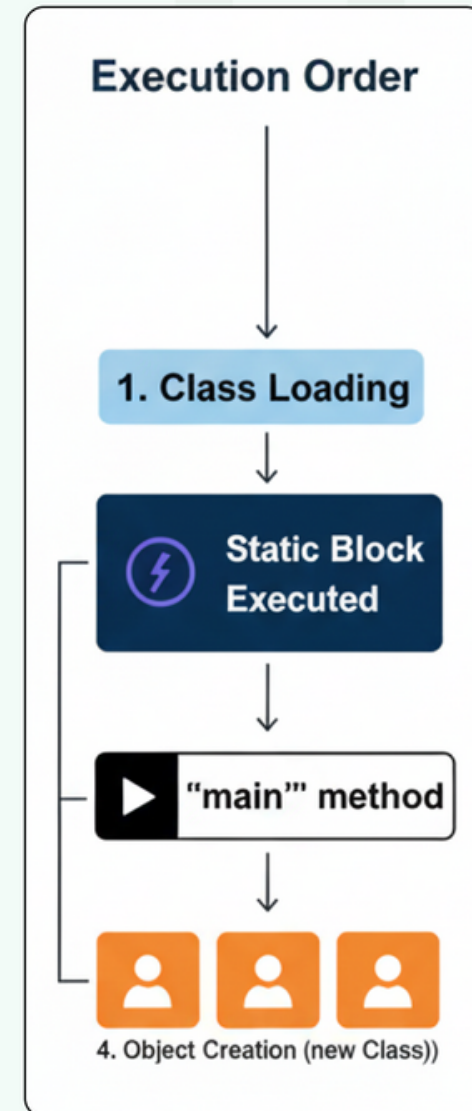
A2: No, because they don't have an associated object.

**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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