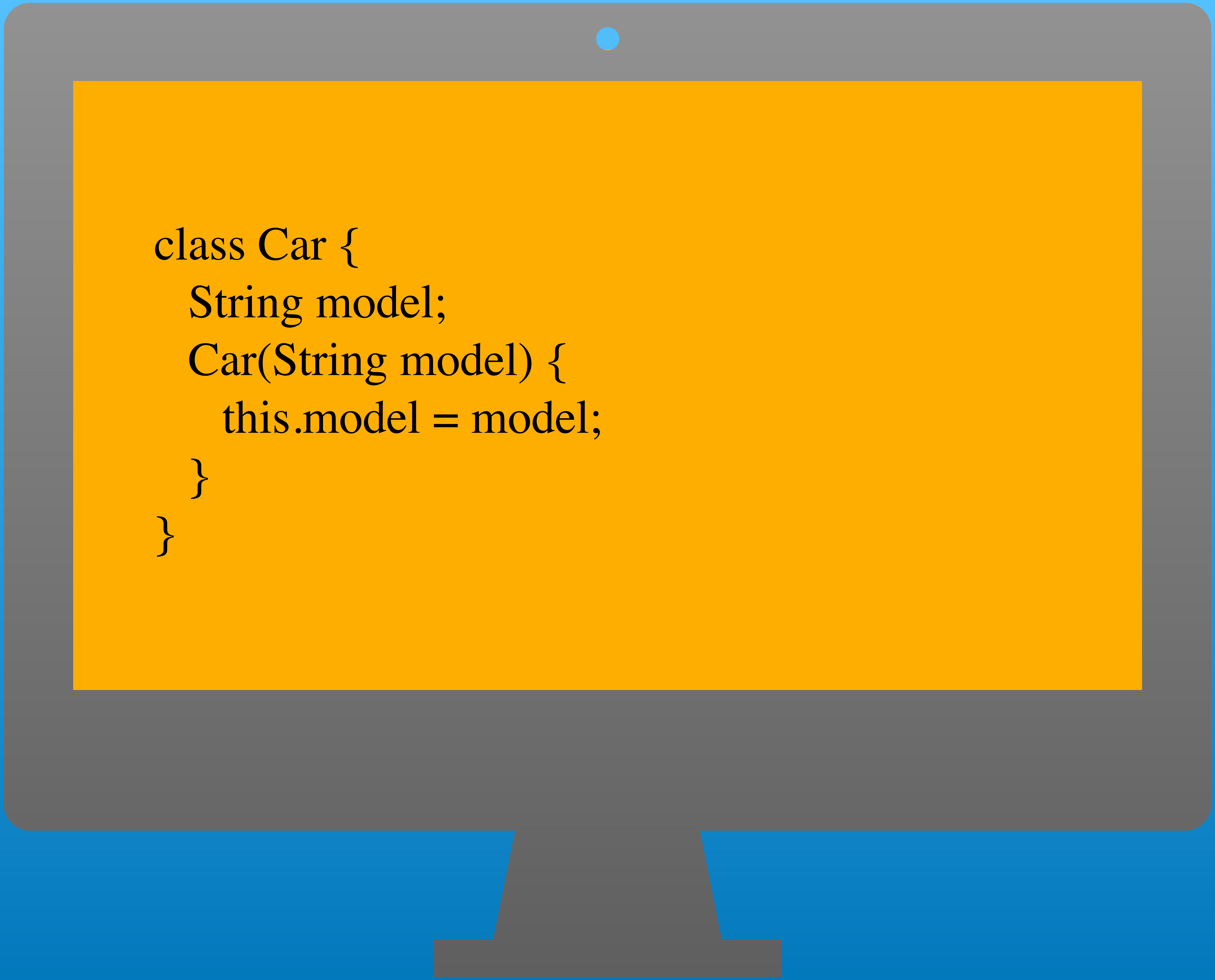
Constructors, Garbage Collection, Object Access Modifiers, and More

Constructors & Garbage Collection, Object Access Modifiers, Method Overloading, `this` keyword, Static (Variable, Method, Block), Final Keyword, and Wrapper Classes,

What is a Constructor?

Constructor initializes objects.
Syntax: Constructor name must match the class name.
Types: Default and Parameterized constructors.



```
class Car {
  String model;
  Car(String model) {
    this.model = model;
  }
}
```

Garbage Collection in Java

Garbage Collection in Java

- Java automatically manages memory using the garbage collector.
- Objects that are no longer referenced are eligible for garbage collection.
- Manual invocation: `System.gc()`
- Important: No guarantee that `gc()` will run immediately.

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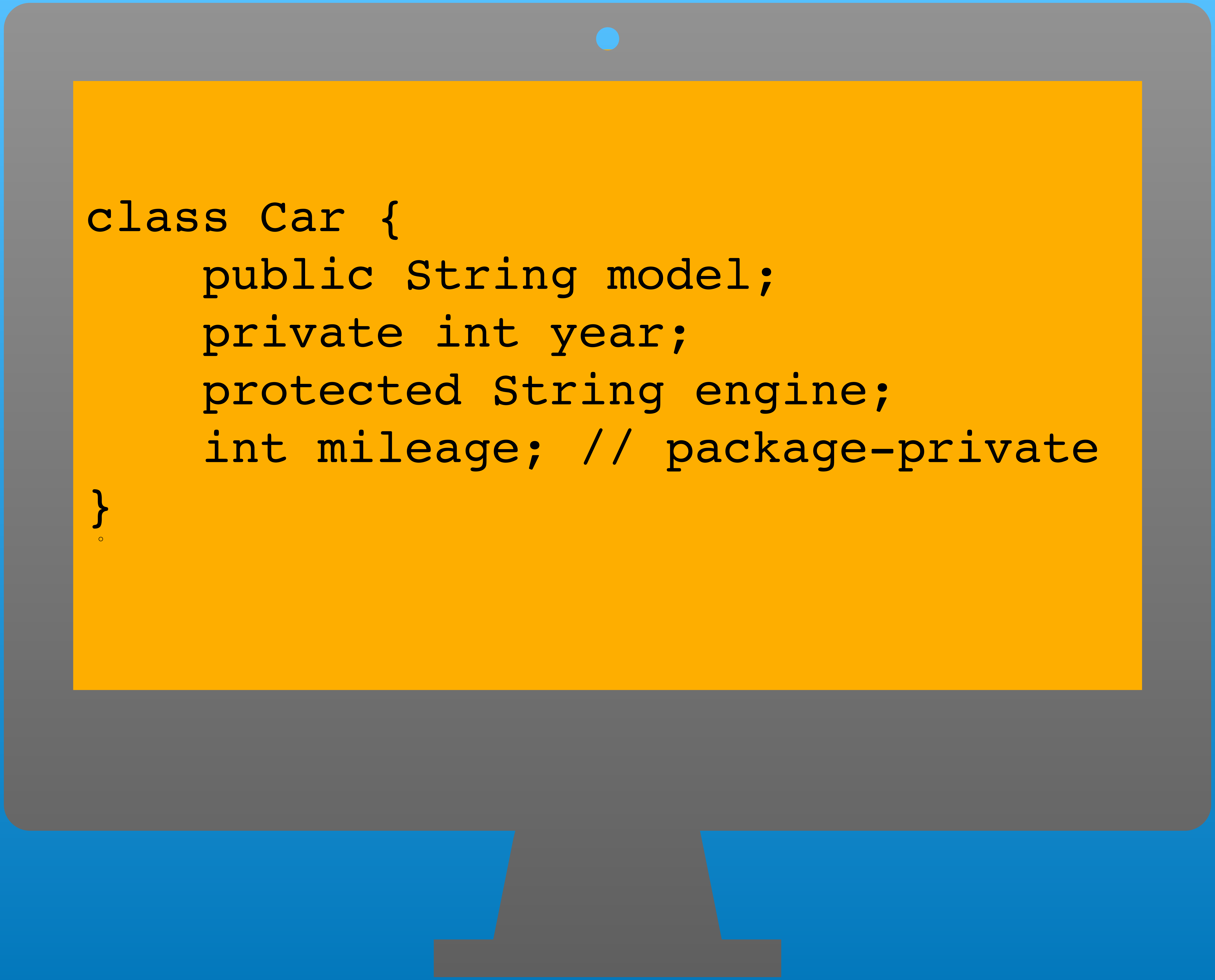
🔵 Default (no modifier): Package-private.



```
class Car {
    public String model;
    private int year;
    protected String engine;
    int mileage; // package-private
}
```

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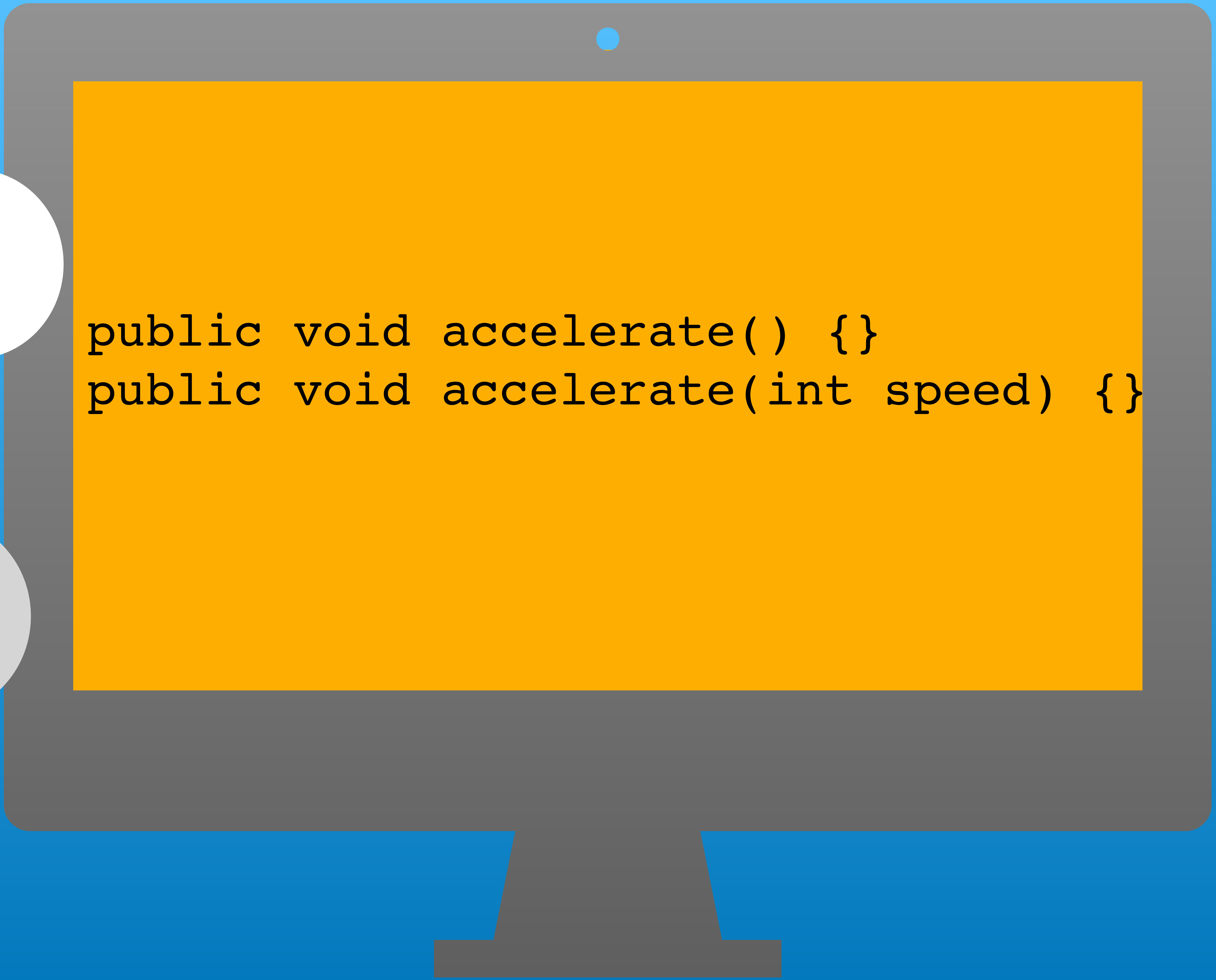

```
public void accelerate() {}
public void accelerate(int speed) {}
```

Rules for Method Overloading

```
class Addition {
    int add(int a, int b) {
        return a + b;
    }
    double add(double a, double b) {
        return a + b;
    }
}
```

Must differ in parameter type, number, or both.
Can’t differ only by return type.

Understanding `this` Keyword

```
class Car {
    String model;
    Car(String model) {
        this.model = model;
    }
}
```

Refers to the current instance of the class.
Used to eliminate confusion between class attributes and parameters.

`this` to Call Constructors

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One constructor can call another using `this()`.

```
class Car {
    String model;
    int year;
    Car(String model) {
        this(model, 2020); // Calling another constructor
    }
    Car(String model, int year) {
        this.model = model;
        this.year = year;
    }
}
```

Static Variables

```
// Shared by all objects of a class.

class Car {
    static int carCount = 0;
    Car() {
        carCount++;
    }
}
```

Static Methods and Static Block

//Static methods can be called without creating an object.
Static block: Executed when the class is loaded.

```
static void showCarCount() {
    System.out.println("Car count: " + carCount);
}


static {
    System.out.println("Static block called");
}
```

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```

Final Keyword Basics

final variable: Can’t be modified once assigned.
final method: Can’t be overridden.
final class: Can’t be subclassed.

```
final int MAX_SPEED = 120;
final void displaySpeed() {
    System.out.println("Speed: " + MAX_SPEED);
}
```

Introduction to Wrapper Classes

Wrapper classes convert primitive data types into objects.
Examples: `Integer`, `Double`, `Boolean`.
Autoboxing and Unboxing: Automatic conversion between primitives and wrappers.

```
Integer i = 10;  // Autoboxing
int j = i;       // Unboxing
```

Why Use Wrapper Classes?

- Useful in Collections (e.g., `ArrayList<Integer>`)
- Offers utility methods (e.g., `Integer.parseInt()`)

Best Practices for Class Design

- Use meaningful variable and method names.
- Keep methods small and focused.
- Use `this` for clarity when working with class variables.
- Leverage method overloading for flexible and readable code.
- Use access modifiers to encapsulate data.

Thank You