

CMSC 132: Object-Oriented Programming II

Effective Java



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Effective Java

■ Title

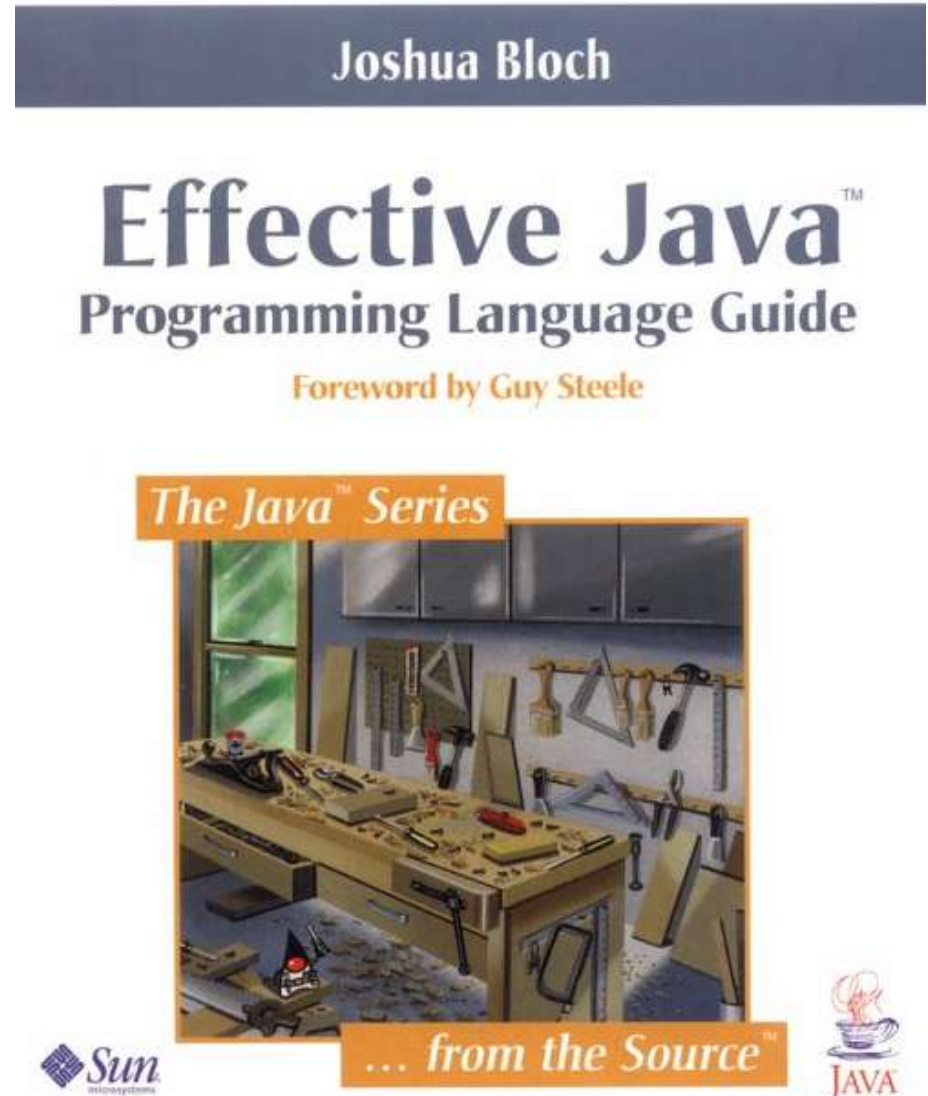
■ Effective Java
Programming
Language Guide

■ Author

■ Joshua Bloch

■ Contents

■ Learn to use Java
language and its
libraries more
effectively



Java Puzzlers (By J. Bloch)

■ Java

- Simple and elegant
- Need to avoid some sharp corners!

■ Puzzlers

- Java code fragments
- Expose some tricky aspects of Java

■ Effective Java

- Patterns and idioms to emulate
- Pitfalls to avoid

What's In A Name?

```
public class Name {  
    private String myName;  
    public Name(String n) { myName = n; }  
    public boolean equals(Object o) {  
        if (!(o instanceof Name)) return false;  
        Name n = (Name)o;  
        return myName.equals(n.myName);  
    }  
    public static void main(String[ ] args) {  
        Set s = new HashSet();  
        s.add(new Name("Donald"));  
        System.out.println(  
            s.contains(new Name("Donald")));  
    }  
}
```

Output

1. True
2. False

3. It Varies

**Name class
violates Java
hashCode()
contract.**

**If you override
equals(), must
also override
hashCode()!**

You're Such A Character

```
public class Trivial {  
    public static void main(String args[ ]) {  
        System.out.print("H" + "a");  
        System.out.print('H' + 'a');  
    }  
}
```

Output

1. Ha

2. HaHa

3. Neither

Prints Ha169

**'H' + 'a' evaluated as *int*,
then converted to String!**

**Use string concatenation
(+) with care. At least one
operand must be a String**

The Confusing Constructor

```
public class Confusing {  
    public Confusing(Object o) {  
        System.out.println("Object");  
    }  
    public Confusing(double[] dArray) {  
        System.out.println("double array");  
    }  
    public static void main(String args[]) {  
        new Confusing(null);  
    }  
}
```

Output

1. Object

2. double array

3. Neither

When multiple overloadings apply, the most specific wins

Avoid overloading. If you overload, avoid ambiguity

Time For A Change

■ Problem

- If you pay \$2.00 for a gasket that costs \$1.10, how much change do you get?

```
public class Change {  
    public static void main(String args[ ]) {  
        System.out.println(2.00 - 1.10);  
    }  
}
```

Output

1. 0.9

2. 0.90

3. **Neither**

Prints 0.8999999999999999. Decimal values can't be represented exactly by float or double

Avoid float or double where exact answers are required. Use BigDecimal, int, or long instead

A Private Matter

```
class Base {  
    public String name = "Base";  
}  
class Derived extends Base {  
    private String name = "Derived";  
}  
public class PrivateMatter {  
    public static void main(String[] args) {  
        System.out.println(new Derived( ).name);  
    }  
}
```

Output

1. Derived
2. Base
3. Neither

Compiler error
in class

PrivateMatter:
Can't access
name

Private field
can hide public.
Avoid hiding &
public fields

Effective Java Topics

- 1. Creating and Destroying Objects**
- 2. Methods Common to All Objects**
- 3. Classes and Interfaces**
- 4. Substitutes for C Constructs**
- 5. Methods**
- 6. General Programming**
- 7. Exceptions**
- 8. Threads**
- 9. Serialization**

Creating and Destroying Objects

- **Consider providing static factory methods instead of constructors**
- **Enforce singleton property with a private constructor**
- **Enforce noninstantiability with a private constructor**
- **Avoid creating duplicate objects**
- **Eliminate obsolete object references**
- **Avoid finalizers**

Methods Common to All Objects

- Obey the general contract when overriding equals
- Always override hashCode when you override equals
- Always override toString
- Override clone judiciously
- Consider implementing Comparable

Classes and Interfaces

- **Minimize the accessibility of classes and members**
- **Favor immutability**
- **Favor composition over inheritance**
- **Design and document for inheritance or else prohibit it**
- **Prefer interfaces to abstract classes**
- **Use interfaces only to define types**
- **Favor static member classes over nonstatic**

Methods

- **Check parameters for validity**
- **Make defensive copies when needed**
- **Design method signatures carefully**
- **Use overloading judiciously**
- **Return zero-length arrays, not nulls**
- **Write doc comments for all exposed API elements**

General Programming

- Minimize the scope of local variables
- Know and use the libraries
- Avoid float and double if exact answers are required
- Avoid strings where other types are more appropriate
- Beware the performance of string concatenation
- Refer to objects by their interfaces
- Prefer interfaces to reflection
- Use native methods judiciously
- Optimize judiciously
- Adhere to generally accepted naming conventions

Exceptions

- **Use exceptions only for exceptional conditions**
- **Use checked exceptions for recoverable conditions and run-time exceptions for programming errors**
- **Avoid unnecessary use of checked exceptions**
- **Favor the use of standard exceptions**
- **Throw exceptions appropriate to the abstraction**
- **Document all exceptions thrown by each method**
- **Include failure-capture information in detail messages**
- **Strive for failure atomicity**
- **Don't ignore exceptions**

Threads

- **Synchronize access to shared mutable data**
- **Avoid excessive synchronization**
- **Never invoke wait outside a loop**
- **Don't depend on the thread scheduler**
- **Document thread safety**
- **Avoid thread groups**