



# Quality Code

Software Testing Principles,  
Practices, and Patterns

Stephen Vance

\_\_\_\_\_

# Quality Code

# Quality Code: Software Testing Principles, Practices, and Patterns

## Table of Contents

Contents

Preface

Acknowledgments

About the Author

Part I: Principles and Practices of Testing

Chapter 1: Engineering, Craftsmanship, and First-Time Quality

Engineering and Craftsmanship

The Role of Craftsmanship in First-Time Quality

Practices Supporting Software Craftsmanship

Unit Testing under Code Checker Constraints

Unit Testing for Coverage

Chapter 2: Intent of Code

Where Did I Put That Intent?

Separating Intent from Implementation

A Simple Example That Makes You Think

Chapter 3: Where Do I Start?

An Approach to Testing

The Recipe

Chapter 4: Design and Testability

A Word on Design Paradigms

Encapsulation and Observability

# **Table of Contents**

Coupling and Testability

## **Chapter 5: Testing Principles**

Craft Your Tests Well

Avoid Test Code in Production

Verify Intent over Implementation

Minimize Coupling

Prefer Minimal, Fresh, Transient Fixtures

Use Available Facilities

Prefer Complete over Partial Verification

Write Small Tests

Separate Your Concerns

Use Unique Values

Keep It Simple: Remove Code

Dont Test the Framework

Sometimes Test the Framework

## **Part II: Testing and Testability Patterns**

### **Chapter 6: The Basics**

Bootstrapping Constructors

Testing Simple Getters and Setters

Share Constants

Locally Redefine

Temporarily Replace

Encapsulate and Override

Adjust Visibility

Verification by Injection

### **Chapter 7: String Handling**

Verification by Containment

Verification by Pattern

Exact Verification by Value

# **Table of Contents**

Exact Verification with Formatted Results

## **Chapter 8: Encapsulation and Override Variations**

Data Injection

Encapsulate Loop Conditions

Error Injection

Replace Collaborators

Use Existing No-Op Classes

## **Chapter 9: Adjusting Visibility**

Packaging Tests with Code

Break It Down

Changing Access Levels

Test-Only Interfaces

Naming the Unnamed

Becoming friend-ly

Coerced Access via Reflection

Declarative Scope Changing

## **Chapter 10: Interlude: Revisiting Intent**

Testing the Singleton Pattern

Singleton Intent

The Testing Strategy

Discerning Intent

## **Chapter 11: Error Condition Verification**

Check the Return Value

Verify the Exception Type

Verify the Exception Message

Verify the Exception Payload

Verify the Exception Instance

Thoughts on Exception Design

## **Chapter 12: Use Existing Seams**

# **Table of Contents**

- Direct Calls
- Dependency Injection
- Callbacks, Observers, Listeners, and Notifiers
- Registries
- Factories
- Logging and Other Facilities of Last Resort

## **Chapter 13: Parallelism**

- A Brief Introduction to Threads and Race Conditions
- A Strategy for Race Condition Reproduction
- Test the Thread Task Directly
- Synchronize through Common Lock
- Synchronize through Injection
- Use Supervisory Control
- Statistical Verification
- Debugger APIs

## **Part III: Worked Examples**

### **Chapter 14: Test-Driven Java**

- Bootstrapping
- First Functionality
- Cutting the Cord
- Moving to Multiples
- Ghost Protocol
- Exercising Options
- Moving Downstream
- Retrospective

### **Chapter 15: Legacy JavaScript**

- Getting Started
- DOMination
- On Toothpaste and Testing

# **Table of Contents**

Scaling Up

Software Archeology

Retrospective

Bibliography

Index