Contents

Preface xi
Acknowledgments xv

Chapter 1 Basics 1
Gotcha #1: Excessive Commenting 1
Gotcha #2: Magic Numbers 4
Gotcha #3: Global Variables 6
Gotcha #4: Failure to Distinguish Overloading from Default Initialization 8
Gotcha #5: Misunderstanding References 10
Gotcha #6: Misunderstanding Const 13
Gotcha #7: Ignorance of Base Language Subtleties 14
Gotcha #8: Failure to Distinguish Access and Visibility 19
Gotcha #9: Using Bad Language 24
Gotcha #10: Ignorance of Idiom 26
Gotcha #11: Unnecessary Cleverness 29
Gotcha #12: Adolescent Behavior 31

Chapter 2 Syntax 35
Gotcha #13: Array/Initializer Confusion 35
Gotcha #14: Evaluation Order Indecision 36
Gotcha #15: Precedence Problems 42
Gotcha #16: `for` Statement Debacle 45
Gotcha #17: Maximal Munch Problems 48
Gotcha #18: Creative Declaration-Specifier Ordering 50
Gotcha #19: Function/Object Ambiguity 51
Gotcha #20: Migrating Type-Qualifiers 52
Gotcha #21: Self-Initialization 53
Gotcha #22: Static and Extern Types 55
Gotcha #23: Operator Function Lookup Anomaly 56
Gotcha #24: Operator -> Subtleties 58

Chapter 3 The Preprocessor 61
Gotcha #25: `#define` Literals 61
Gotcha #26: `#define` Pseudofunctions 64
Gotcha #27: Overuse of `#if` 66
Gotcha #28: Side Effects in Assertions 72

Chapter 4 Conversions 75
Gotcha #29: Converting through `void *` 75
Gotcha #30: Slicing 79
Gotcha #31: Misunderstanding Pointer-to-Const Conversion 81
Gotcha #32: Misunderstanding Pointer-to-Pointer-to-Const Conversion 82
Gotcha #33: Misunderstanding Pointer-to-Pointer-to-Base Conversion 86
Gotcha #34: Pointer-to-Multidimensional-Array Problems 87
Gotcha #35: Unchecked Downcasting 89
Gotcha #36: Misusing Conversion Operators 90
Gotcha #37: Unintended Constructor Conversion 95
Gotcha #38: Casting under Multiple Inheritance 98
Gotcha #39: Casting Incomplete Types 100
Gotcha #40: Old-Style Casts 102
Gotcha #41: Static Casts 103
Gotcha #42: Temporary Initialization of Formal Arguments 106
Gotcha #43: Temporary Lifetime 110
Gotcha #44: References and Temporaries 112
Gotcha #45: Ambiguity Failure of `dynamic_cast` 116
Gotcha #46: Misunderstanding Contravariance 120

Chapter 5 Initialization 125
Gotcha #47: Assignment/Initialization Confusion 125
Gotcha #48: Improperly Scoped Variables 129
Gotcha #49: Failure to Appreciate C++'s Fixation on Copy Operations 132
Gotcha #50: Bitwise Copy of Class Objects 136
Gotcha #51: Confusing Initialization and Assignment in Constructors 139
Gotcha #52: Inconsistent Ordering of the Member Initialization List 141
Gotcha #53: Virtual Base Default Initialization 142
Gotcha #54: Copy Constructor Base Initialization 147
Gotcha #55: Runtime Static Initialization Order 150
Gotcha #56: Direct versus Copy Initialization 153
Gotcha #57: Direct Argument Initialization 156
Gotcha #58: Ignorance of the Return Value Optimizations 158
Gotcha #59: Initializing a Static Member in a Constructor 163

Chapter 6 Memory and Resource Management 167
Gotcha #60: Failure to Distinguish Scalar and Array Allocation 167
Gotcha #61: Checking for Allocation Failure 171
Gotcha #62: Replacing Global New and Delete 173
Gotcha #63: Confusing Scope and Activation of Member `new` and `delete` 176
Gotcha #64: Throwing String Literals 177
Gotcha #65: Improper Exception Mechanics 180
Gotcha #66: Abusing Local Addresses 185
Gotcha #67: Failure to Employ Resource Acquisition Is Initialization 190
Gotcha #68: Improper Use of `auto_ptr` 195

Chapter 7 Polymorphism 199
Gotcha #69: Type Codes 199
Gotcha #70: Nonvirtual Base Class Destructor 204
Gotcha #71: Hiding Nonvirtual Functions 209
Gotcha #72: Making Template Methods Too Flexible 212
Gotcha #73: Overloading Virtual Functions 214
Gotcha #74: Virtual Functions with Default Argument Initializers 216
Gotcha #75: Calling Virtual Functions in Constructors and Destructors 218
Gotcha #76: Virtual Assignment 220
Gotcha #77: Failure to Distinguish among Overloading, Overriding, and Hiding 224
Gotcha #78: Failure to Grok Virtual Functions and Overriding 230
Gotcha #79: Dominance Issues 236

Chapter 8 Class Design 241
Gotcha #80: Get/Set Interfaces 241
Gotcha #81: Const and Reference Data Members 245
Gotcha #82: Not Understanding the Meaning of Const Member Functions 248
Gotcha #83: Failure to Distinguish Aggregation and Acquaintance 253
Gotcha #84: Improper Operator Overloading 258
Gotcha #85: Precedence and Overloading 261
Gotcha #86: Friend versus Member Operators 262
Gotcha #87: Problems with Increment and Decrement 264
Gotcha #88: Misunderstanding Templated Copy Operations 268

Chapter 9 Hierarchy Design 271
Gotcha #89: Arrays of Class Objects 271
Gotcha #90: Improper Container Substitutability 273
Gotcha #91: Failure to Understand Protected Access 277

Gotcha #92: Public Inheritance for Code Reuse 281
Gotcha #93: Concrete Public Base Classes 285
Gotcha #94: Failure to Employ Degenerate Hierarchies 286
Gotcha #95: Overuse of Inheritance 287
Gotcha #96: Type-Based Control Structures 292
Gotcha #97: Cosmic Hierarchies 295
Gotcha #98: Asking Personal Questions of an Object 299
Gotcha #99: Capability Queries 302

Bibliography 307
Index 309