### Contents at a Glance

**Introduction** ................................................................. 1

**Book I: Getting Started with C++** ............................... 7
- Chapter 1: Configuring Your System .......................................................... 9
- Chapter 2: Creating Your First C++ Application ................................................. 27
- Chapter 3: Storing Data in C++ .................................................................. 47
- Chapter 4: Directing the Application Flow .................................................. 77
- Chapter 5: Dividing Your Work with Functions ........................................... 101
- Chapter 6: Splitting Up Source Code Files ............................................... 129
- Chapter 7: Referring to Your Data Through Pointers ................................. 145
- Chapter 8: Working with Classes ................................................................. 175
- Chapter 9: Using Advanced C++ Features ............................................... 211

**Book II: Understanding Objects and Classes** ............... 247
- Chapter 1: Planning and Building Objects ............................................... 249
- Chapter 2: Describing Your Program with UML ........................................ 279
- Chapter 3: Structuring Your Classes with UML ....................................... 299
- Chapter 4: Demonstrating Behavior with UML .......................................... 313
- Chapter 5: Modeling Your Applications with UML ..................................... 331
- Chapter 6: Building with Design Patterns ................................................. 343

**Book III: Fixing Problems** ............................................. 373
- Chapter 1: Dealing with Bugs ................................................................. 375
- Chapter 2: Debugging an Application ....................................................... 387
- Chapter 3: Stopping and Inspecting Your Code .......................................... 399
- Chapter 4: Traveling About the Stack .......................................................... 411

**Book IV: Advanced Programming** ................................. 421
- Chapter 1: Working with Arrays, Pointers, and References .......................... 423
- Chapter 2: Creating Data Structures ........................................................... 455
- Chapter 3: Constructors, Destructors, and Exceptions .................................. 477
- Chapter 4: Advanced Class Usage ............................................................... 505
- Chapter 5: Creating Classes with Templates .............................................. 529
- Chapter 6: Programming with the Standard Library .................................... 561
- Chapter 7: Working with Lambda Expressions .......................................... 599
# Table of Contents

**Introduction** ................................................................. 1  
No Experience Necessary..........................................................1  
Great for Advanced Folks, Too! ..................................................2  
For All Computers ..................................................................2  
Conventions .............................................................................3  
Organization .............................................................................3  
Icons Galore .............................................................................4  
What’s Next? ..........................................................................5  
Beyond the Book ...................................................................5

**Book I: Getting Started with C++ .................................. 7**

**Chapter 1: Configuring Your System ................................. 9**  
Obtaining a Copy of C++ 14 .....................................................10  
Obtaining Code::Blocks .........................................................10  
Installing Code::Blocks ........................................................11  
  Working with Windows .........................................................11  
  Working with Mac OS/X ........................................................13  
  Using the standard Linux installation ......................................14  
  Using the graphical Linux installation ....................................14  
Touring the Essential Code::Blocks Features .........................17  
  Starting Code::Blocks for the first time .......................17  
  Opening the sample projects ...........................................19  
  Viewing the essential windows ........................................20  
Using Other IDEs ................................................................25

**Chapter 2: Creating Your First C++ Application ..................27**  
Code::Blocks Creating a Project ..............................................27  
  Understanding projects ......................................................28  
  Defining your first project ..................................................28  
  Building and executing your first application .................33  
Typing the Code................................................................34  
  Starting with Main ............................................................36  
  Showing Information .........................................................36  
  Doing some math .............................................................40  
  Tabbing your output ........................................................44  
Let Your Application Run Away.............................................46
## Chapter 3: Storing Data in C++

- **Putting Your Data Places: Variables** .......................................................... 47
  - Creating an integer variable ......................................................................... 48
  - Declaring multiple variables ....................................................................... 51
  - Changing values .......................................................................................... 51
  - Setting one variable equal to another ......................................................... 52
  - Initializing a variable .................................................................................. 53
  - Creating a great name for yourself .............................................................. 53

- **Manipulating Integer Variables** ................................................................ 55
  - Adding integer variables ............................................................................ 56
  - Subtracting integer variables ..................................................................... 60
  - Multiplying integer variables ..................................................................... 61
  - Dividing integer variables ......................................................................... 62

- **Characters** ............................................................................................... 64
  - Null character ............................................................................................. 64
  - Nonprintable and other cool characters .................................................... 64

- **Strings** ...................................................................................................... 67
  - Getting a part of a string ............................................................................ 68
  - Changing part of a string ........................................................................... 69
  - Adding onto a string ................................................................................... 69
  - Adding two strings ..................................................................................... 70

- **Deciding between Conditional Operators** ............................................... 71

- **Telling the Truth with Boolean Variables** .................................................. 74

- **Reading from the Console** ........................................................................ 74

## Chapter 4: Directing the Application Flow

- **Doing This or Doing That** ......................................................................... 78
- **Evaluating Conditions in C++** .................................................................. 78
  - Finding the right C++ operators .................................................................. 79
  - Combining multiple evaluations .................................................................. 80
- **Including Evaluations in C++ Conditional Statements** ............................. 81
  - Deciding what if and also what else ............................................................ 82
  - Going further with the else and if ............................................................... 83

- **Repeating Actions with Statements That Loop** ........................................ 84
  - Looping situations ...................................................................................... 85
  - Looping for ................................................................................................. 86
  - Looping while ............................................................................................. 92
  - Doing while ................................................................................................ 94
  - Breaking and continuing .......................................................................... 95
  - Nesting loops .............................................................................................. 97

## Chapter 5: Dividing Your Work with Functions

- **Dividing Your Work** .................................................................................. 101
- **Calling a Function** .................................................................................... 106
  - Passing a variable ...................................................................................... 107
  - Passing multiple variables ....................................................................... 108
## Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Splitting Up Source Code Files</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>Creating Multiple Source Files</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>Splitting a project into multiple source files in Code::Blocks</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>Creating a project in Code::Blocks with multiple existing files</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Multiple source files in other compilers</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Creating multiple files</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>Sharing with Header Files</td>
<td>138</td>
</tr>
<tr>
<td></td>
<td>Adding the header only once</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>Using brackets or quotes</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>Sharing Variables among Source Files</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>Using the Mysterious Header Wrappers</td>
<td>143</td>
</tr>
<tr>
<td>7</td>
<td>Referring to Your Data Through Pointers</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>Heaping and Stacking the Variables</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>Getting a variable’s address</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Changing a variable by using a pointer</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>Pointing at a string</td>
<td>153</td>
</tr>
<tr>
<td></td>
<td>Pointing to something else</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>Tips on pointer variables</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>Dynamically Allocating with new</td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>Using new</td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>Using an initializer</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>Making new strings</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>Freeing Pointers</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>Passing Pointer Variables to Functions</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>Changing variable values with pointers</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>Modifying string parameters</td>
<td>167</td>
</tr>
<tr>
<td></td>
<td>Returning Pointer Variables from Functions</td>
<td>168</td>
</tr>
<tr>
<td></td>
<td>Returning a Pointer as a Nonpointer</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>Passing by Reference</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>Passing By const Reference</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>Remembering the Rules</td>
<td>173</td>
</tr>
<tr>
<td>8</td>
<td>Working with Classes</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td>Understanding Objects and Classes</td>
<td>175</td>
</tr>
<tr>
<td></td>
<td>Classifying classes and objects</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>Describing member functions and data</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>Implementing a class</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Separating member function code</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>The parts of a class</td>
<td>187</td>
</tr>
</tbody>
</table>
Working with a Class ................................................................. 188
  Accessing members ..................................................................... 188
  Using classes and pointers .......................................................... 191
  Passing objects to functions ...................................................... 194
  Using const parameters in functions .......................................... 195
  Using the this pointer ............................................................... 196
  Overloading member functions .................................................. 199
Starting and Ending with Constructors and Destructors ............... 201
  Starting with constructors ....................................................... 201
  Ending with destructors ............................................................ 202
  Sampling constructors and destructors ...................................... 203
  Adding parameters to constructors ............................................ 205
Building Hierarchies of Classes .................................................... 206
  Creating a hierarchy in C++ .................................................... 207
  Understanding types of inheritance .......................................... 208
Creating and Using Object Aliases ................................................ 209

Chapter 9: Using Advanced C++ Features ................................. 211
  Filling Your Code with Comments ............................................ 211
  Converting Types ...................................................................... 213
  Reading from the Console ........................................................ 219
  Understanding Preprocessor Directives ....................................... 223
  Using Constants ........................................................................ 230
  Using Switch Statements ......................................................... 233
  Supercharging enums with Classes .......................................... 236
  Working with Random Numbers ............................................... 238
  Storing Data in Arrays ............................................................. 240
  Declaring and accessing an array .............................................. 240
  Arrays of pointers ................................................................. 241
  Passing arrays to functions ...................................................... 243
  Adding and subtracting pointers .............................................. 244

Book II: Understanding Objects and Classes .............................. 247

Chapter 1: Planning and Building Objects ................................. 249
  Recognizing Objects ............................................................... 249
  Observing the Mailboxes class .................................................. 251
  Observing the Mailbox class ..................................................... 252
  Finding other objects .............................................................. 254
  Encapsulating Objects ............................................................ 254
  Building Hierarchies .............................................................. 260
  Establishing a hierarchy .......................................................... 260
  Protecting members when inheriting ........................................ 262
  Overriding member functions ................................................. 267
  Specializing with polymorphism .............................................. 269
  Getting abstract about things ................................................ 270
<table>
<thead>
<tr>
<th>Chapter 2: Describing Your Program with UML</th>
<th>279</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving Up to UML</td>
<td>279</td>
</tr>
<tr>
<td>Modeling with UML</td>
<td>283</td>
</tr>
<tr>
<td>Diagramming and designing with UML</td>
<td>283</td>
</tr>
<tr>
<td>Building with UML and the Rational Unified Process</td>
<td>288</td>
</tr>
<tr>
<td>Speaking iteratively</td>
<td>290</td>
</tr>
<tr>
<td>Phasing in and out</td>
<td>292</td>
</tr>
<tr>
<td>The inception phase</td>
<td>293</td>
</tr>
<tr>
<td>The elaboration phase</td>
<td>294</td>
</tr>
<tr>
<td>The construction phase</td>
<td>295</td>
</tr>
<tr>
<td>The transition phase</td>
<td>296</td>
</tr>
<tr>
<td>Moving Forward with UML</td>
<td>297</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 3: Structuring Your Classes with UML</th>
<th>299</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing Classes</td>
<td>300</td>
</tr>
<tr>
<td>Mapping classes with UML</td>
<td>301</td>
</tr>
<tr>
<td>Inheriting in UML</td>
<td>304</td>
</tr>
<tr>
<td>Aggregating and composing classes</td>
<td>305</td>
</tr>
<tr>
<td>Building Components</td>
<td>307</td>
</tr>
<tr>
<td>Deploying the Software</td>
<td>310</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4: Demonstrating Behavior with UML</th>
<th>313</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drawing Objects</td>
<td>313</td>
</tr>
<tr>
<td>Casing Out the Use Cases</td>
<td>315</td>
</tr>
<tr>
<td>Expanding use cases</td>
<td>317</td>
</tr>
<tr>
<td>Matching use cases and requirements</td>
<td>318</td>
</tr>
<tr>
<td>Sequence Diagrams</td>
<td>318</td>
</tr>
<tr>
<td>Notating sequence diagrams</td>
<td>321</td>
</tr>
<tr>
<td>Looping and comparing in sequence diagrams</td>
<td>322</td>
</tr>
<tr>
<td>Collaboration Diagrams</td>
<td>325</td>
</tr>
<tr>
<td>Activity Diagrams</td>
<td>326</td>
</tr>
<tr>
<td>State Diagrams</td>
<td>328</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 5: Modeling Your Applications with UML</th>
<th>331</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using UML Goodies</td>
<td>331</td>
</tr>
<tr>
<td>Packaging your symbols</td>
<td>331</td>
</tr>
<tr>
<td>Notating your diagrams</td>
<td>334</td>
</tr>
<tr>
<td>Tagging your symbols</td>
<td>335</td>
</tr>
<tr>
<td>Free to Be UML</td>
<td>336</td>
</tr>
<tr>
<td>C++ and UML</td>
<td>338</td>
</tr>
<tr>
<td>Drawing enumerations</td>
<td>338</td>
</tr>
<tr>
<td>Including static members</td>
<td>339</td>
</tr>
<tr>
<td>Parameterizing classes with templates</td>
<td>340</td>
</tr>
</tbody>
</table>
Chapter 6: Building with Design Patterns ................................. 343
   Introducing a Simple Pattern: the Singleton ............................................ 344
   Watching an Instance with an Observer ........................................... 348
   Observers and the Standard C++ Library ........................................... 353
   Automatically adding an observer .................................................. 354
   Mediating with a Pattern ............................................................................ 356

Book III: Fixing Problems................................................................. 373

Chapter 1: Dealing with Bugs ......................................................... 375
   It’s Not a Bug. It’s a Feature! ................................................................. 375
   Make Your Application Features Look Like Features............................ 377
   Anticipating (Almost) Everything ........................................................... 378
   Avoiding Mistakes, Plain and Simple .................................................. 385

Chapter 2: Debugging an Application ........................................... 387
   Programming with Debuggers ......................................................... 387
   Running the debugger ...................................................................... 389
   Recognizing the parts of the Code::Blocks debugger...................... 395
   Debugging with Different Tools ......................................................... 397
   Standard debuggers ........................................................................... 397
   Debugging a Code::Blocks Application with Command Line Arguments ............................................................. 398

Chapter 3: Stopping and Inspecting Your Code .............................. 399
   Setting and Disabling Breakpoints ..................................................... 400
   Setting a breakpoint in Code::Blocks .................................................. 401
   Enabling and disabling breakpoints .................................................... 402
   Watching, Inspecting, and Changing Variables .................................... 404
   Watching the variables ..................................................................... 406
   Watching objects ............................................................................... 407
   Changing values ............................................................................... 408

Chapter 4: Traveling About the Stack ............................................. 411
   Stacking Your Data ........................................................................... 411
   Moving about the stack .................................................................... 412
   Storing local variables ..................................................................... 414
   Debugging with Advanced Features ................................................ 416
   Viewing threads ................................................................................. 416
   Tracing through assembly code ....................................................... 417
## Book IV: Advanced Programming

### Chapter 1: Working with Arrays, Pointers, and References

- Building Up Arrays  
- Declaring arrays
- Arrays and pointers
- Using multidimensional arrays
- Arrays and command-line parameters
- Allocating an array on the heap
- Storing arrays of pointers and arrays of arrays
- Building constant arrays
- Pointing with Pointers
- Becoming horribly complex
- Pointers to functions
- Pointing a variable to a member function
- Pointing to static member functions

### Chapter 2: Creating Data Structures

- Working with Data
- The great variable roundup
- Expressing variables from either side
- Casting a spell on your data
- Casting safely with C++
- Dynamically casting with dynamic_cast
- Statically casting with static_cast
- Structuring Your Data
- Structures as component data types
- Equating structures
- Returning compound data types
- Naming Your Space
- Using variables and part of a namespace

### Chapter 3: Constructors, Destructors, and Exceptions

- Constructing and Destructing Objects
- Overloading constructors
- Initializing members
- Adding a default constructor
- Functional constructors
- Calling one constructor from another
- Copying instances with copy constructors
When constructors go bad: Failable constructors? ......................492
Destroying your instances.................................................................493
Virtually inheriting destructors .......................................................495
Programming the Exceptions to the Rule ..........................................498
Throwing direct instances .................................................................500
Catching any exception .....................................................................502
Rethrowing an exception ..................................................................503

Chapter 4: Advanced Class Usage ......................................................505
Inherently Inheriting Correctly .........................................................505
Morphing your inheritance ..................................................................505
Adjusting access ................................................................................508
Returning something different, virtually speaking ........................510
Multiple inheritance ..........................................................................514
Virtual inheritance .............................................................................516
Friend classes and functions ............................................................520
Using Classes and Types within Classes ..............................................521
Nesting a class ....................................................................................521
Types within classes ..........................................................................526

Chapter 5: Creating Classes with Templates ........................................529
Templatizing a Class ...........................................................................529
Separating a template from the function code ...................................536
Including static members in a template .............................................538
Parameterizing a Template ................................................................540
Putting different types in the parameter .............................................541
Including multiple parameters ........................................................544
Typedefing a Template .......................................................................547
Deriving Templates ............................................................................548
Deriving classes from a class template ..............................................548
Deriving a class template from a class ..............................................550
Deriving a class template from a class template ..............................552
Templatizing a Function .....................................................................554
Overloading and function templates ................................................556
Templatizing a member function ......................................................559

Chapter 6: Programming with the Standard Library .........................561
Architecting the Standard Library ......................................................562
Containing Your Classes.....................................................................562
Storing in a vector ..............................................................................562
Mapping your data ............................................................................565
Containing instances, pointers, or references ...................................566
Comparing instances .........................................................................570
Iterating through a container ............................................................574
A map of pairs in your hand ..............................................................578
## Table of Contents

The Great Container Showdown ................................................................. 578
  - Associating and storing with a set ................................................. 578
  - Unionizing and intersecting sets ...................................................... 581
  - Listing with list ........................................................................... 584
  - Stacking the deque ........................................................................ 589
  - Waiting in line with stacks and queues ......................................... 589

Copying Containers ..................................................................................... 592
Creating and Using Dynamic Arrays ............................................................ 594
  - Configuring the IDE .................................................................... 594
  - Declaring a dynamic array ......................................................... 594

Working with Unordered Data ................................................................. 596
  - Using std::unordered_set to create an unordered set ................. 596
  - Manipulating unordered sets ..................................................... 597

### Chapter 7: Working with Lambda Expressions ................................ 599
  - Creating More Readable and Concise C++ Code ....................... 600
  - Defining the Essential Lambda Expression .................................. 601
    - Defining the parts of a lambda expression .............................. 601
    - Relying on compiler detection of return type ......................... 602
    - Using a specific return type ................................................... 604
    - Using the auto keyword ......................................................... 605
  - Developing Applications with Lambda Expressions ...................... 607
    - Creating lambda expressions with multiple inputs .................. 607
    - Working with the capture clause .......................................... 609
    - Sorting data using a lambda expression .................................. 610
    - Specifying that the lambda expression throws exceptions ....... 612

### Book V: Reading and Writing Files ............................................. 615

#### Chapter 1: Filing Information with the Streams Library .......... 617
  - Seeing a Need for Streams ......................................................... 618
  - Programming with the Streams Library ....................................... 619
    - Getting the right header file .................................................... 620
    - Opening a file ....................................................................... 621
  - Handling Errors When Opening a File ........................................ 624
  - Flagging the ios Flags ............................................................... 627

#### Chapter 2: Writing with Output Streams ............................... 631
  - Inserting with the << Operator .................................................. 631
  - Formatting Your Output ............................................................. 633
    - Formatting with flags .............................................................. 634
    - Specifying a precision ............................................................ 637
    - Setting the width and creating fields ...................................... 640
Chapter 3: Reading with Input Streams ................................................. 645
  Extracting with Operators........................................................................ 645
  Encountering the End of File .................................................................... 648
  Reading Various Types ............................................................................. 653
  Reading Formatted Input .......................................................................... 657

Chapter 4: Building Directories and Contents ........................................ 659
  Manipulating Directories .......................................................................... 660
    Creating a directory ............................................................................... 660
    Deleting a directory ............................................................................ 661
  Getting the Contents of a Directory .......................................................... 661
  Copying Files .......................................................................................... 664
  Moving and Renaming Files and Directories ........................................... 666

Chapter 5: Streaming Your Own Classes .................................................. 669
  Streaming a Class for Text Formatting ..................................................... 670
  Manipulating a Stream ............................................................................ 673
    What's a manipulator? .......................................................................... 673
    Writing your own manipulator ............................................................. 676

Book VI: Advanced C++ ............................................................................. 681

Chapter 1: Exploring the Standard Library Further .................................. 683
  Considering the Standard Library Categories ......................................... 684
    Containers ........................................................................................... 685
    Iterators .............................................................................................. 685
    Algorithms .......................................................................................... 686
    Functors .............................................................................................. 687
    Utilities ............................................................................................... 689
    Adaptors .............................................................................................. 690
    Allocators ........................................................................................... 690
    Polymorphic allocators ....................................................................... 691
  Parsing Strings Using a Hash ................................................................... 691
  Obtaining Information Using a Random Access Iterator ....................... 694
  Locating Values Using the Find Algorithm ............................................. 697
  Using the Random Number Generator .................................................... 698
  Performing Comparisons Using min and max ........................................ 700
  Working with Temporary Buffers ........................................................... 701

Chapter 2: Working with User-Defined Literals (UDLs) .......................... 703
  Understanding the Need for UDLs .......................................................... 703
  Prefixes and suffixes ............................................................................. 704
  Differentiating between raw and cooked ................................................. 707
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working with the UDLs Included in the Standard Library</td>
<td>708</td>
</tr>
<tr>
<td><code>std::basic_string</code></td>
<td>708</td>
</tr>
<tr>
<td><code>std::complex</code></td>
<td>711</td>
</tr>
<tr>
<td><code>std::chrono::duration</code></td>
<td>712</td>
</tr>
<tr>
<td>Creating Your Own UDLs</td>
<td>714</td>
</tr>
<tr>
<td>Developing a conversion UDL</td>
<td>714</td>
</tr>
<tr>
<td>Developing a custom type UDL</td>
<td>715</td>
</tr>
<tr>
<td>Using a custom UDL for side effects</td>
<td>716</td>
</tr>
<tr>
<td>Chapter 3: Building Original Templates</td>
<td>717</td>
</tr>
<tr>
<td>Deciding When to Create a Template</td>
<td>718</td>
</tr>
<tr>
<td>Defining the Elements of a Good Template</td>
<td>719</td>
</tr>
<tr>
<td>Creating a Basic Math Template</td>
<td>721</td>
</tr>
<tr>
<td>Building a Structure Template</td>
<td>722</td>
</tr>
<tr>
<td>Developing a Class Template</td>
<td>725</td>
</tr>
<tr>
<td>Considering Template Specialization</td>
<td>728</td>
</tr>
<tr>
<td>Creating a Template Library</td>
<td>730</td>
</tr>
<tr>
<td>Defining the library project</td>
<td>730</td>
</tr>
<tr>
<td>Configuring the library project</td>
<td>732</td>
</tr>
<tr>
<td>Coding the library</td>
<td>734</td>
</tr>
<tr>
<td>Using Your Template Library</td>
<td>735</td>
</tr>
<tr>
<td>Chapter 4: Investigating Boost</td>
<td>737</td>
</tr>
<tr>
<td>Understanding Boost</td>
<td>738</td>
</tr>
<tr>
<td>Boost features</td>
<td>738</td>
</tr>
<tr>
<td>Licensing</td>
<td>739</td>
</tr>
<tr>
<td>Paid support</td>
<td>740</td>
</tr>
<tr>
<td>Obtaining and Installing Boost for Code::Blocks</td>
<td>740</td>
</tr>
<tr>
<td>Unpacking Boost</td>
<td>741</td>
</tr>
<tr>
<td>Using the header-only libraries</td>
<td>742</td>
</tr>
<tr>
<td>Building the libraries</td>
<td>743</td>
</tr>
<tr>
<td>Testing the installation</td>
<td>744</td>
</tr>
<tr>
<td>Creating the Boost Tools</td>
<td>749</td>
</tr>
<tr>
<td>Using Boost.Build</td>
<td>752</td>
</tr>
<tr>
<td>Getting a successful build</td>
<td>753</td>
</tr>
<tr>
<td>Using the examples</td>
<td>753</td>
</tr>
<tr>
<td>Using Regression</td>
<td>754</td>
</tr>
<tr>
<td>Using Inspect</td>
<td>755</td>
</tr>
<tr>
<td>Understanding BoostBook</td>
<td>757</td>
</tr>
<tr>
<td>Using QuickBook</td>
<td>758</td>
</tr>
<tr>
<td>Using bcp</td>
<td>759</td>
</tr>
<tr>
<td>Using Wave</td>
<td>761</td>
</tr>
<tr>
<td>Building Your First Boost Application Using Date Time</td>
<td>762</td>
</tr>
</tbody>
</table>
Chapter 5: Boosting up a Step ......................................................... 765
  Parsing Strings Using RegEx............................................................. 766
  Adding the RegEx library ................................................................ 767
  Creating the RegEx code ................................................................. 770
  Breaking Strings into Tokens Using Tokenizer .............................. 772
  Performing Numeric Conversion .................................................... 773
  Creating Improved Loops Using Foreach ...................................... 776
  Accessing the Operating System Using Filesystem .................... 778

Appendix: Automating Your Applications with Makefiles ................. 783

Index ................................................................................................. 795