



CONTENTS

Preface	xiv
Before You Begin	xxiii
1 Car Payment Calculator and Guess the Number Applications	1
<i>Introducing Computers, the Internet and C++ Programming</i>	
1.1 What Is a Computer?	1
1.2 Computer Organization	2
1.3 The Internet and the World Wide Web	3
1.4 Machine Languages, Assembly Languages and High-Level Languages	4
1.5 C++	6
1.6 Java	7
1.7 Fortran, COBOL, Pascal and Ada	7
1.8 BASIC, Visual Basic, Visual C++ and .NET	8
1.9 Key Software Trend: Object Technology	9
1.10 Compiling and Running C++ Applications	10
1.11 Test-Driving the Car Payment Calculator and Guess the Number Applications	11
1.12 Internet and Web Resources	14
1.13 Wrap-Up	15
2 Welcome Application	19
<i>Introduction to C++ Programming</i>	
2.1 Test-Driving the Welcome Application	19
2.2 Compiling and Running the Template Welcome Application	20
2.3 Introduction to C++ Code	26
2.4 Constructing the Welcome Application	29
2.5 Compilation Errors	34
2.6 Wrap-Up	36
3 Inventory Application	45
<i>Introducing Variables, Input, Memory Concepts and Arithmetic</i>	
3.1 Test-Driving the Inventory Application	45
3.2 Variables	46
3.3 Performing Stream Input Using <code>cin</code>	48
3.4 Performing a Calculation and Displaying the Result	49
3.5 Memory Concepts	52
3.6 Arithmetic	53
3.7 Using the Debugger: Breakpoints	56
3.8 Web Resources	59
3.9 Wrap-Up	59

4	Wage Calculator Application	68
	<i>Introducing Algorithms, Pseudocode and Program Control</i>	
4.1	Test-Driving the Wage Calculator Application	68
4.2	Algorithms	70
4.3	Pseudocode	71
4.4	Control Statements	71
4.5	if Selection Statement	73
4.6	if...else Selection Statement	75
4.7	Constructing the Wage Calculator Application	78
4.8	Assignment Operators	81
4.9	Formatting Numbers	83
4.10	Using the Debugger: The Watch and Locals Windows	86
4.11	Wrap-Up	89
5	Dental Payment Application	100
	<i>Introducing Logical Operators, chars and strings</i>	
5.1	Test-Driving the Dental Payment Application	100
5.2	Constructing the Dental Payment Application	102
5.3	Introduction to chars and strings	102
5.4	Logical Operators	108
5.5	Wrap-Up	116
6	Car Payment Calculator Application	125
	<i>Introducing the while Repetition Statement</i>	
6.1	Test-Driving the Car Payment Calculator Application	125
6.2	while Repetition Statement	126
6.3	Increment and Decrement Operators	129
6.4	Constructing the Car Payment Calculator Application	130
6.5	do...while Repetition Statement	138
6.6	Wrap-Up	140
7	Class Average Application	151
	<i>Introducing Sentinel-Controlled Repetition</i>	
7.1	Test-Driving the Class Average Application	151
7.2	Sentinel-Controlled Repetition	153
7.3	Creating the Class Average Application	154
7.4	Wrap-Up	160
8	Interest Calculator Application	169
	<i>Introducing the for Repetition Statement and the Math Library</i>	
8.1	Test-Driving the Interest Calculator Application	169
8.2	Essentials of Counter-Controlled Repetition	171
8.3	Introducing the for Repetition Statement	172
8.4	Examples Using the for Statement	174
8.5	Constructing the Interest Calculator Application	175
8.6	Wrap-Up	181
9	Income Tax Calculator Application	190
	<i>Introducing the switch Multiple-Selection Statement</i>	
9.1	Test-Driving the Income Tax Calculator Application	190
9.2	Introducing the switch Multiple-Selection Statement	191
9.3	Constructing the Income Tax Calculator Application	194
9.4	Wrap-Up	200

10	Enhancing the Wage Calculator Application	209
	<i>Introducing Functions</i>	
10.1	Test-Driving the Enhanced Wage Calculator Application	209
10.2	C++ Standard Library Functions and Classes	210
10.3	Function Definitions	211
10.4	Completing the Maximum Application	217
10.5	Using Functions in the Wage Calculator Application	219
10.6	Using the Debugger: Controlling Execution Using the Step Into , Step Over , Step Out and Continue Commands	223
10.7	Wrap-Up	226
11	Fundraiser Application	236
	<i>Introducing Scope and Function Prototypes</i>	
11.1	Test-Driving the Fundraiser Application	236
11.2	Constructing the Fundraiser Application	237
11.3	Function Prototypes	240
11.4	Wrap-Up	245
12	Craps Game Application	253
	<i>Introducing Random Number Generation and Enumerations</i>	
12.1	Test-Driving the Craps Game Application	253
12.2	Random Number Generation	255
12.3	Using an enum in the Craps Game Application	256
12.4	Using Random Numbers in the Craps Game Application	260
12.5	Wrap-Up	268
13	Salary Survey Application	277
	<i>Introducing One-Dimensional Arrays</i>	
13.1	Test-Driving the Salary Survey Application	277
13.2	Introducing Arrays	279
13.3	Declaring and Initializing Arrays	281
13.4	Constructing the Salary Survey Application	283
13.5	Wrap-Up	292
14	Student Grades Application	302
	<i>Introducing Two-Dimensional Arrays and References</i>	
14.1	Test-Driving the Student Grades Application	302
14.2	Two-Dimensional Arrays	304
14.3	Inserting Code into the Student Grades Application	306
14.4	Wrap-Up	317
15	Digital Clock Application	326
	<i>Building Your Own Classes and Objects</i>	
15.1	Test-Driving the Digital Clock Application	326
15.2	Designing the Digital Clock Application	328
15.3	Separating Interface from Implementation	330
15.4	Initializing Objects: Constructors	334
15.5	<i>Get</i> and <i>Set</i> Functions	337
15.6	Completing the Digital Clock Application	342
15.7	Passing Arguments to a Constructor	345
15.8	Using the Debugger: The Autos Window	352
15.9	Wrap-Up	355

16	Shopping List Application	367
	<i>Introducing Pointers, References and Dynamic Data Structures</i>	
16.1	Test-Driving the Shopping List Application	367
16.2	Introducing Pointers	369
16.3	Pointer Operators	370
16.4	Passing Arguments to Functions by Reference	372
16.5	Designing the Shopping List Application	376
16.6	Constructing the Shopping List Application	378
16.7	Implementing a Linked List	382
16.8	Wrap-Up	394
17	Payroll Application	407
	<i>Introducing Inheritance and Polymorphism</i>	
17.1	Test-Driving the Payroll Application	407
17.2	Inheritance Overview	410
17.3	Creating the Payroll Application	413
17.4	Using a Derived Class in the Payroll Application	417
17.5	Using Multiple Derived Classes in the Payroll Application	421
17.6	Polymorphism	428
17.7	Completing the Payroll Application	430
17.8	Wrap-Up	444
18	Ticket Information Application	456
	<i>Introducing Sequential-Access Files</i>	
18.1	Test-Driving the Write Event and Ticket Information Applications	456
18.2	Data Hierarchy	459
18.3	Files and Streams	462
18.4	Creating the Write Event Application: Writing to a File	463
18.5	Creating the Ticket Information Application	471
18.6	Wrap-Up	478
19	Screen Scraping Application	487
	<i>Introducing string Processing</i>	
19.1	Test-Driving the Screen Scraping Application	487
19.2	Fundamentals of <code>strings</code>	489
19.3	Constructing the Screen Scraping Application	491
19.4	Locating Substrings in <code>strings</code>	491
19.5	Extracting Substrings from <code>strings</code>	496
19.6	Other <code>string</code> Functions	497
19.7	Wrap-Up	501
20	Enhanced Car Payment Calculator Application	510
	<i>Introducing Exception Handling</i>	
20.1	Test-Driving the Enhanced Car Payment Calculator Application	510
20.2	Introduction to Exception Handling	512
20.3	Throwing Exceptions in C++	513
20.4	Handling Exceptions in C++	514
20.5	C++ Stream Error States and Exceptions	516
20.6	Constructing the Enhanced Car Payment Calculator Application	518
20.7	Wrap-Up	524
21	Grade Book Application	532
	<i>Introducing Templates</i>	
21.1	Test-Driving the Grade Book Application	532

21.2	Function Templates	535
21.3	Class Templates	540
21.4	Constructing the Grade Book Application	541
21.5	Wrap-Up	556
22	Phone Book Application	566
	<i>Introducing Operator Overloading</i>	
22.1	Test-Driving the Phone Book Application	566
22.2	Fundamentals of Operator Overloading	568
22.3	Restrictions on Operator Overloading	569
22.4	Overloaded Operator Functions	570
22.5	Creating the Phone Book Application	573
22.6	Wrap-Up	584
A	Dive Into™ the GNU C++ Tools	593
23.1	Compiling and Running the Completed Welcome Application	593
23.2	Syntax Errors	595
23.3	Using the Debugger: Breakpoints	597
23.4	Using the Debugger: The print and set commands	601
23.5	Using the Debugger: Controlling Execution Using the step , finish and next Commands	604
23.6	Compiling and Running the Digital Clock Application	608
23.7	Using the Debugger: The watch Command	609
B	Operator Precedence Chart	610
C	ASCII Character Set	612
D	C++ Standard Library Reference	613
E	Keyword Chart	622
	Glossary	623
	Index	636