



# CONTENTS

<b>Preface</b>	<b>xiv</b>
<b>Before You Begin</b>	<b>xxiii</b>
<b>1 Car Payment Calculator and Guess the Number Applications</b>	<b>1</b>
<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 <b>Car Payment Calculator</b> and <b>Guess the Number</b> Applications	11
1.12 Internet and Web Resources	14
1.13 Wrap-Up	15
<b>2 Welcome Application</b>	<b>19</b>
<i>Introduction to C++ Programming</i>	
2.1 Test-Driving the <b>Welcome</b> Application	19
2.2 Compiling and Running the Template <b>Welcome</b> Application	20
2.3 Introduction to C++ Code	26
2.4 Constructing the <b>Welcome</b> Application	29
2.5 Compilation Errors	34
2.6 Wrap-Up	36
<b>3 Inventory Application</b>	<b>45</b>
<i>Introducing Variables, Input, Memory Concepts and Arithmetic</i>	
3.1 Test-Driving the <b>Inventory</b> 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

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

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

<b>16</b>	<b>Shopping List Application</b>	<b>367</b>
	<i>Introducing Pointers, References and Dynamic Data Structures</i>	
16.1	Test-Driving the <b>Shopping List</b> 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 <b>Shopping List</b> Application	376
16.6	Constructing the <b>Shopping List</b> Application	378
16.7	Implementing a Linked List	382
16.8	Wrap-Up	394
<b>17</b>	<b>Payroll Application</b>	<b>407</b>
	<i>Introducing Inheritance and Polymorphism</i>	
17.1	Test-Driving the <b>Payroll</b> Application	407
17.2	Inheritance Overview	410
17.3	Creating the <b>Payroll</b> Application	413
17.4	Using a Derived Class in the <b>Payroll</b> Application	417
17.5	Using Multiple Derived Classes in the <b>Payroll</b> Application	421
17.6	Polymorphism	428
17.7	Completing the <b>Payroll</b> Application	430
17.8	Wrap-Up	444
<b>18</b>	<b>Ticket Information Application</b>	<b>456</b>
	<i>Introducing Sequential-Access Files</i>	
18.1	Test-Driving the <b>Write Event</b> and <b>Ticket Information</b> Applications	456
18.2	Data Hierarchy	459
18.3	Files and Streams	462
18.4	Creating the <b>Write Event</b> Application: Writing to a File	463
18.5	Creating the <b>Ticket Information</b> Application	471
18.6	Wrap-Up	478
<b>19</b>	<b>Screen Scraping Application</b>	<b>487</b>
	<i>Introducing string Processing</i>	
19.1	Test-Driving the <b>Screen Scraping</b> Application	487
19.2	Fundamentals of <code>strings</code>	489
19.3	Constructing the <b>Screen Scraping</b> 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
<b>20</b>	<b>Enhanced Car Payment Calculator Application</b>	<b>510</b>
	<i>Introducing Exception Handling</i>	
20.1	Test-Driving the Enhanced <b>Car Payment Calculator</b> 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 <b>Car Payment Calculator</b> Application	518
20.7	Wrap-Up	524
<b>21</b>	<b>Grade Book Application</b>	<b>532</b>
	<i>Introducing Templates</i>	
21.1	Test-Driving the <b>Grade Book</b> Application	532

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