

<i>Some Background on Design Patterns</i>	<i>10</i>
Defining Design Patterns	11
This Book and its Parentage	13
The Learning Process	13
Studying Design Patterns	14
Notes on Object Oriented Approaches	14
The Java Foundation Classes	15
Java Design Patterns	15
1. Creational Patterns	17
<i>The Factory Pattern</i>	<i>18</i>
How a Factory Works	18
Sample Code	18
The Two Derived Classes	19
Building the Factory	20
Factory Patterns in Math Computation	22
When to Use a Factory Pattern	24
Thought Questions	25
<i>The Abstract Factory Pattern</i>	<i>26</i>
A GardenMaker Factory	26
How the User Interface Works	28
Consequences of Abstract Factory	30
Thought Questions	30
<i>The Singleton Pattern</i>	<i>31</i>
Throwing the Exception	32
Creating an Instance of the Class	32
Static Classes as Singleton Patterns	33
Creating Singleton Using a Static Method	34

Finding the Singletons in a Large Program	35
Other Consequences of the Singleton Pattern	35
<i>The Builder Pattern</i>	37
An Investment Tracker	38
Calling the Builders	40
The List Box Builder	42
The Checkbox Builder	43
Consequences of the Builder Pattern	44
Thought Questions	44
<i>The Prototype Pattern</i>	45
Cloning in Java	45
Using the Prototype	47
Consequences of the Prototype Pattern	50
<i>Summary of Creational Patterns</i>	51
2. The Java Foundation Classes	52
Installing and Using the JFC	52
Ideas Behind Swing	53
The Swing Class Hierarchy	53
<i>Writing a Simple JFC Program</i>	54
Setting the Look and Feel	54
Setting the Window Close Box	55
Making a JFrame Class	55
A Simple Two Button Program	56
More on JButtons	57
<i>Buttons and Toolbars</i>	59
Radio Buttons	59
The JToolBar	59
Toggle Buttons	60

Sample Code	61
<i>Menus and Actions</i>	62
Action Objects	62
Design Patterns in the Action Object	65
<i>The JList Class</i>	67
List Selections and Events	68
Changing a List Display Dynamically	69
<i>The JTable Class</i>	71
A Simple JTable Program	71
Cell Renderers	74
<i>The JTree Class</i>	77
The TreeModel Interface	78
Summary	79
3. Structural Patterns	80
<i>The Adapter Pattern</i>	81
Moving Data between Lists	81
Using the JFC JList Class	83
Two Way Adapters	87
Pluggable Adapters	87
Adapters in Java	88
<i>The Bridge Pattern</i>	90
Building a Bridge	91
Consequences of the Bridge Pattern	93
<i>The Composite Pattern</i>	95
An Implementation of a Composite	96
Building the Employee Tree	98
Restrictions on Employee Classes	100

Consequences of the Composite Pattern	100
Other Implementation Issues	101
<i>The Decorator Pattern</i>	<i>103</i>
Decorating a CoolButton	103
Using a Decorator	105
Inheritance Order	107
Decorating Borders in Java	107
Non-Visual Decorators	109
Decorators, Adapters and Composites	110
Consequences of the Decorator Pattern	110
<i>The Façade Pattern</i>	<i>111</i>
Building the Façade Classes	112
Consequences of the Façade	115
<i>The Flyweight Pattern</i>	<i>117</i>
Discussion	117
Example Code	118
Flyweight Uses in Java	122
Sharable Objects	122
<i>The Proxy Pattern</i>	<i>124</i>
Sample Code	124
Copy-on-Write	127
Comparison with Related Patterns	127
<i>Summary of structural patterns</i>	<i>128</i>
4. Behavioral Patterns	129
<i>Chain of Responsibility</i>	<i>130</i>
Applicability	130
Sample Code	131

The List Boxes	133
A Chain or a Tree?	135
Kinds of Requests	137
Examples in Java	137
Consequences of the Chain of Responsibility	138
<i>The Command Pattern</i>	<i>139</i>
Motivation	139
The Command Pattern	140
Building Command Objects	141
The Command Pattern in Java	142
Consequences of the Command Pattern	143
Providing Undo	144
<i>The Interpreter Pattern</i>	<i>145</i>
Motivation	145
Applicability	145
Sample Code	146
Interpreting the Language	147
Objects Used in Parsing	148
Reducing the Parsed Stack	150
Consequences of the Interpreter Pattern	153
<i>The Iterator Pattern</i>	<i>155</i>
Motivation	155
Enumerations in Java	156
Filtered Iterators	156
Sample Code	157
Consequence of the Iterator Pattern	159
Composites and Iterators	160
<i>The Mediator Pattern</i>	<i>161</i>

An Example System	161
Interactions between Controls	162
Sample Code	164
Mediators and Command Objects	167
Consequences of the Mediator Pattern	167
Implementation Issues	168
<i>The Memento Pattern</i>	169
Motivation	169
Implementation	169
Sample Code	170
Consequences of the Memento	175
Other Kinds of Mementos	176
<i>The Observer Pattern</i>	177
Watching Colors Change	178
The Message to the Media	181
The JList as an Observer	182
The MVC Architecture as an Observer	183
Consequences of the Observer Pattern	184
<i>The State Pattern</i>	185
Sample Code	185
Switching Between States	190
How the Mediator Interacts with the State Manager	191
Consequences of the State Pattern	192
State Transitions	192
Thought Questions	192
<i>The Strategy Pattern</i>	194
Motivation	194
Sample Code	195

The Context	196
The Program Commands	197
The Line and Bar Graph Strategies	198
Drawing Plots in Java	198
Consequences of the Strategy Pattern	201
<i>The Template Pattern</i>	202
Motivation	202
Kinds of Methods in a Template Class	203
Sample Code	204
The Triangle Drawing Program	207
Templates and Callbacks	208
Summary and Consequences	209
<i>The Visitor Pattern</i>	210
Motivation	210
When to Use the Visitor Pattern	211
Sample Code	212
Visiting Several Classes	214
Bosses are Employees, too	215
Double Dispatching	216
Traversing a Series of Classes	216
Consequence of the Visitor Pattern	216