

1 Basic Concepts	1
1.1 Introduction	1
1.2 Abstraction	7
1.3 Separation	11
1.4 Classes, Objects, and Abstraction	16
1.5 Composition	24
1.6 Generalization	31
1.7 Putting it All Together	40
2 Using Objects of a Single Class	49
2.1 Introduction	49
2.2 Structure of Classes and Objects	55
2.3 Manipulating Objects in a Java Application	64
2.4 Manipulating GUI Objects in a Simple Programming Environment	69
2.5 Named Constants	84
2.6 Overloaded Methods	92
2.7 Overloaded Methods in Java Classes	98
2.8 Arrays of Objects	104
2.9 Managing Objects	114
3 Using Objects of Different Classes	119
3.1 Introduction	119
3.2 Using Objects for Communicating Data	121
3.3 Sequencing of Interactions	138
3.4 Simple Associations	148
3.5 Interfaces	161
3.6 Declaring Parameters of an Interface Type	166
3.7 More Complex Associations	182

4	Implementing a New Class	203
4.1	Introduction	203
4.2	Implementing a Class.....	205
4.3	The Role of Aggregation	218
4.4	Simple Static Aggregation.....	226
4.5	More Complex Static Aggregation	231
4.6	Dynamic Aggregation	242
4.7	The “this” Variable	250
4.8	Copying Mutable Objects	258
5	Producing an Object-Oriented System.....	265
5.1	Introduction	265
5.2	Designing a Class	266
5.3	Designing Complex Logic	286
5.4	Debugging	298
5.5	Organizing Related Classes in Packages.....	310
5.6	Documenting a Class	318
6	Inheritance	327
6.1	Introduction	327
6.2	Using Inheritance to Share Implementation	329
6.3	Inheriting Methods and Data	341
6.4	Replacing Inherited Methods.....	354
6.5	Extending Inherited Methods	361
6.6	Hiding Inherited Methods.....	365
6.7	Type Casting	369
6.8	Dynamic Binding, Abstract Methods, and Polymorphism	381
6.9	Refactoring of Base Classes	391
6.10	Designing a Class Hierarchy.....	395
6.11	Designing Patterns	404
7	Building User Interfaces in Java	411
7.1	Introduction	411
7.2	Structure of a User Interface	415
7.3	Two Simple Applications.....	430
7.4	Event Handling Concepts.....	444
7.5	Handling Events in Simple Applications	452
7.6	Menus.....	463
7.7	Checkboxes.....	477
7.8	Lists.....	485
7.9	Dialogues.....	489

7.10 Scrollbars	501
7.11 TextFields	515
7.12 Images	518
7.13 Layout Managers	531
 8 Input/Output in Java	559
8.1 Introduction	559
8.2 Binary I/O	564
8.3 Text I/O	573
8.4 Random Access File I/O	588
8.5 Object I/O	595
8.6 I/O Filtering	600
 9 Threads	607
9.1 Introduction	607
9.2 Independent Threads	608
9.3 Synchronized Threads	616
9.4 Distributed Concurrency	633
 Index	653