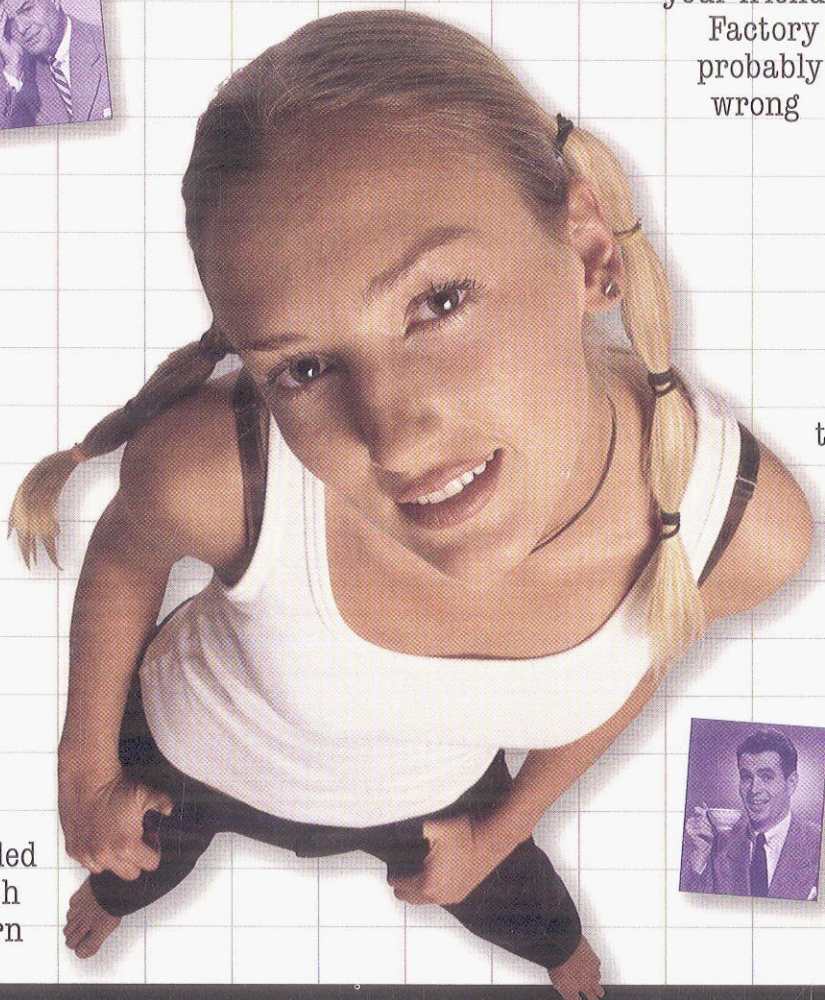
A Brain-Friendly Guide

Head First Design Patterns

Avoid those embarrassing coupling mistakes

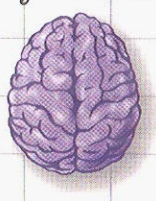
Discover the secrets of the Patterns Guru

Find out how Starbuzz Coffee doubled their stock price with the Decorator pattern



Learn why everything your friends know about Factory pattern is probably wrong

Load the patterns that matter straight into your brain



See why Jim's love life improved when he cut down his inheritance

Eric Freeman & Elisabeth Freeman
with Kathy Sierra & Bert Bates

O'REILLY®

Table of Contents (summary)

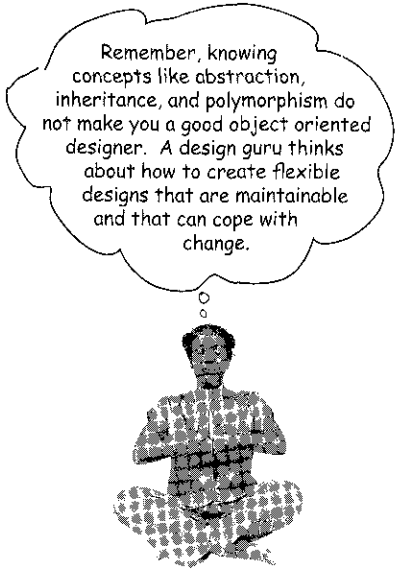
Table of Contents (the real thing)

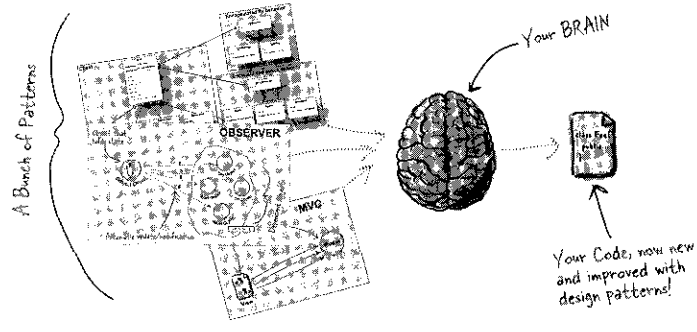
Intro

Your brain on Design Patterns. Here *you* are trying to *learn* something, while here your *brain* is doing you a favor by making sure the learning doesn't *stick*. Your brain's thinking, "Better leave room for more important things, like which wild animals to avoid and whether naked snowboarding is a bad idea." So how *do* you trick your brain into thinking that your life depends on knowing Design Patterns?

1 Welcome to Design Patterns

Someone has already solved your problems. In this chapter, you'll learn why (and how) you can exploit the wisdom and lessons learned by other developers who've been down the same design problem road and survived the trip. Before we're done, we'll look at the use and benefits of design patterns, look at some key OO design principles, and walk through an example of how one pattern works. The best way to use patterns is to *load your brain* with them and then *recognize places* in your designs and existing applications where you can *apply them*. Instead of *code* reuse, with patterns you get *experience* reuse.

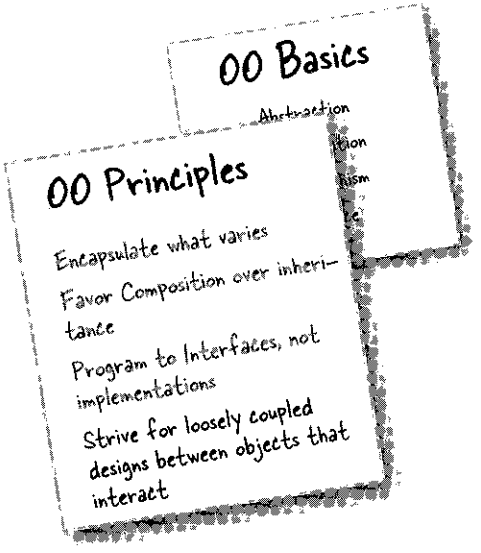


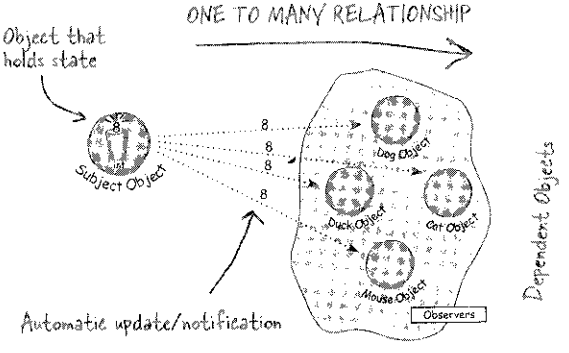


2 Keeping your Objects in the Know

Don't miss out when something interesting happens!

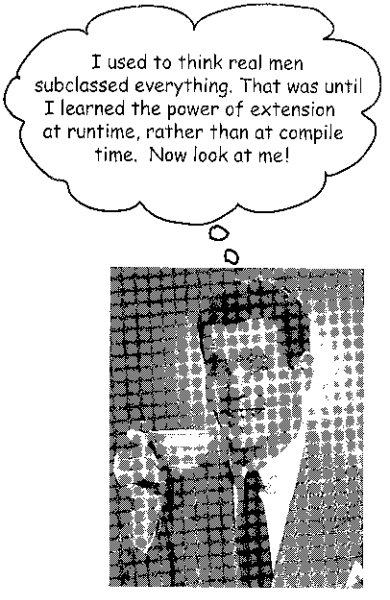
We've got a pattern that keeps your objects in the know when something they might care about happens. Objects can even decide at runtime whether they want to be kept informed. The Observer Pattern is one of the most heavily used patterns in the JDK, and it's incredibly useful. Before we're done, we'll also look at one to many relationships and loose coupling (yeah, that's right, we said coupling). With Observer, you'll be the life of the Patterns Party.





3 Decorating Objects

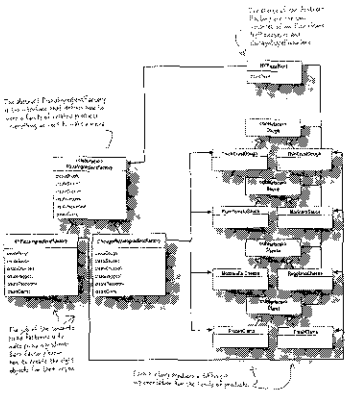
Just call this chapter "Design Eye for the Inheritance Guy." We'll re-examine the typical overuse of inheritance and you'll learn how to decorate your classes at runtime using a form of object composition. Why? Once you know the techniques of decorating, you'll be able to give your (or someone else's) objects new responsibilities *without making any code changes to the underlying classes.*

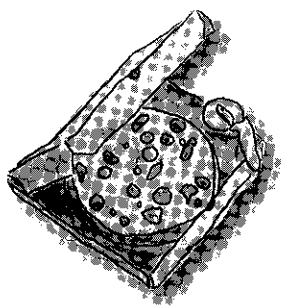


4 Baking with OO Goodness

Get ready to cook some loosely coupled OO designs.

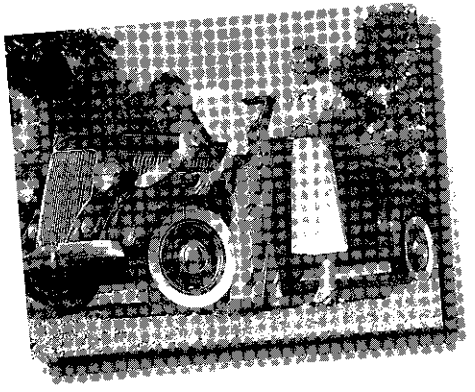
There is more to making objects than just using the **new** operator. You'll learn that instantiation is an activity that shouldn't always be done in public and can often lead to *coupling problems*. And you don't want *that*, do you? Find out how Factory Patterns can help save you from embarrasing dependencies.

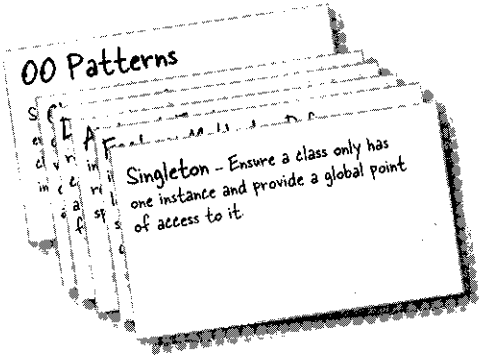




5 One of a Kind Objects

The Singleton Pattern: your ticket to creating one-of-a-kind objects, for which there is only one instance. You might be happy to know that of all patterns, the Singleton is the simplest in terms of its class diagram; in fact the diagram holds just a single class! But don't get too comfortable; despite its simplicity from a class design perspective, we'll encounter quite a few bumps and potholes in its implementation. So buckle up—this one's not as simple as it seems...

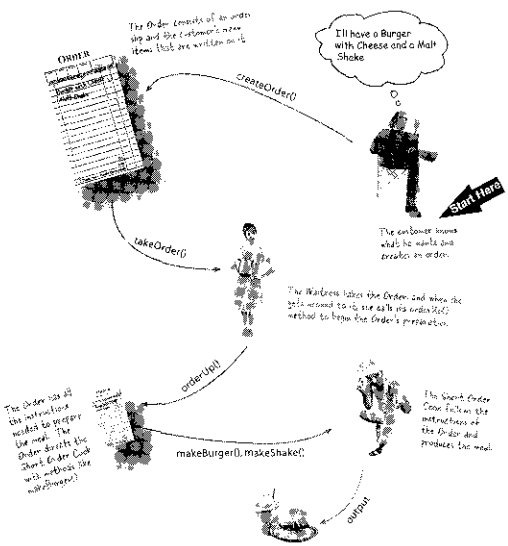




6 Encapsulating Invocation

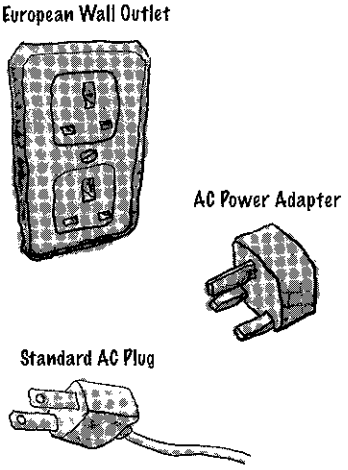
In this chapter we take encapsulation to a whole new level: we're going to encapsulate *method invocation*.

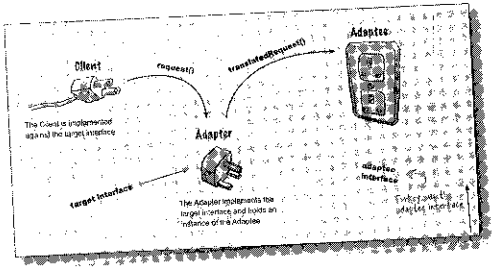
That's right, by encapsulating invocation we can crystallize pieces of computation so that the object invoking the computation doesn't need to worry about how to do things; it just uses our crystallized method to get it done. We can also do some wickedly smart things with these encapsulated method invocations, like save them away for logging or reuse them to implement undo in our code.



7 Being Adaptive

In this chapter we're going to attempt such impossible feats as putting a square peg in a round hole. Sound impossible? Not when we have Design Patterns. Remember the Decorator Pattern? We **wrapped objects** to give them new responsibilities. Now we're going to wrap some objects with a different purpose: to make their interfaces look like something they're not. Why would we do that? So we can adapt a design expecting one interface to a class that implements a different interface. That's not all, while we're at it we're going to look at another pattern that wraps objects to simplify their interface.





8

Encapsulating Algorithms

We've encapsulated object creation, method invocation, complex interfaces, ducks, pizzas... what could be next?

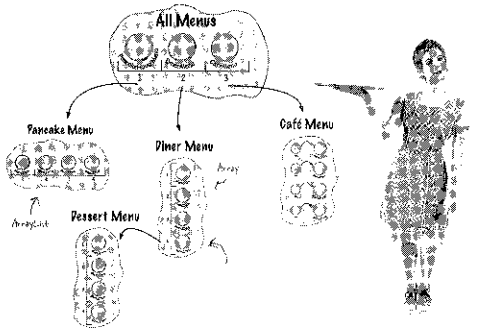
We're going to get down to encapsulating *pieces of algorithms* so that subclasses can hook themselves right into a computation anytime they want. We're even going to learn about a design principle inspired by Hollywood.

9

Well-Managed Collections

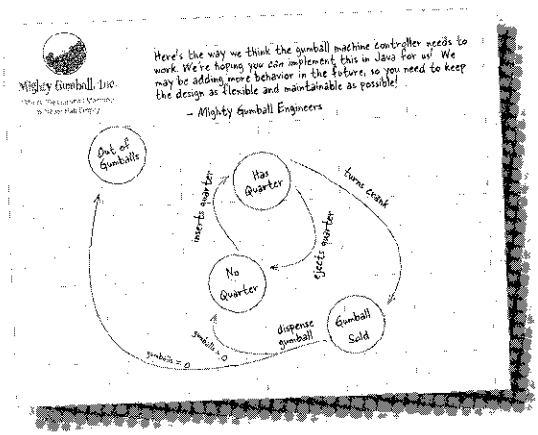
There are lots of ways to stuff objects into a collection.

Put them in an Array, a Stack, a List, a Map, take your pick. Each has its own advantages and tradeoffs. But when your client wants to iterate over your objects, are you going to show him your implementation? We certainly hope not! That just *wouldn't* be professional. Don't worry—in this chapter you'll see how you can let your clients *iterate* through your objects without ever seeing how you *store* your objects. You're also going to learn how to create some *super collections* of objects that can leap over some impressive data structures in a single bound. You're also going to learn a thing or two about object responsibility.



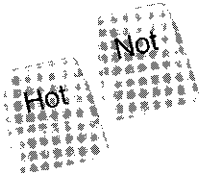
10 The State of Things

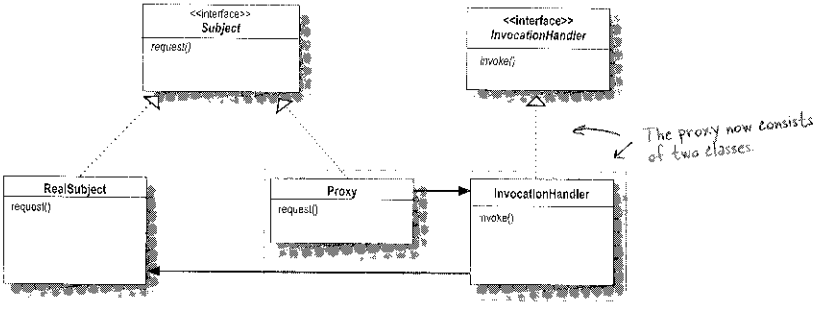
A little known fact: the Strategy and State Patterns were twins separated at birth. As you know, the Strategy Pattern went on to create a wildly successful business around interchangeable algorithms. State, however, took the perhaps more noble path of helping objects learn to control their behavior by changing their internal state. He's often overheard telling his object clients, "just repeat after me, I'm good enough, I'm smart enough, and doggonit...



11 Controlling Object Access

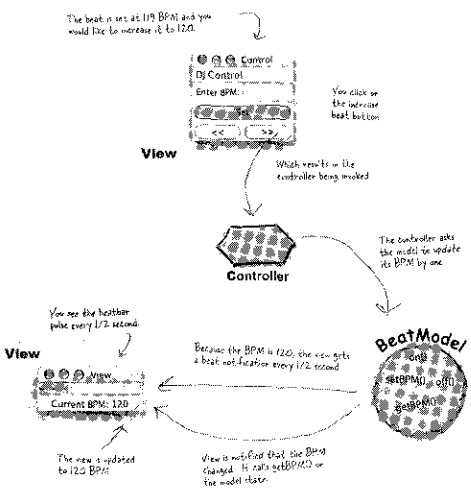
Ever play good cop, bad cop? You're the good cop and you provide all your services in a nice and friendly manner, but you don't want *everyone* asking you for services, so you have the bad cop *control access* to you. That's what proxies do: control and manage access. As you're going to see there are *lots* of ways in which proxies stand in for the objects they proxy. Proxies have been known to haul entire method calls over the Internet for their proxied objects; they've also been known to patiently stand in the place for some pretty lazy objects.

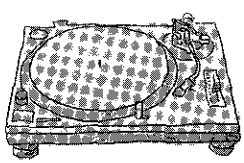




12 Patterns of Patterns

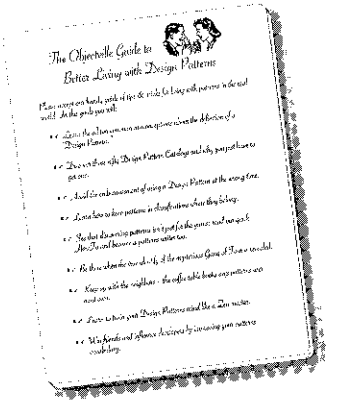
Who would have ever guessed that Patterns could work together? You've already witnessed the acrimonious Fireside Chats (and be thankful you didn't have to see the *Pattern Death Match* pages that the publisher forced us to remove from the book so we could avoid having to use a Parent's Advisory warning label), so who would have thought patterns can actually get along well together? Believe it or not, some of the most powerful OO designs use several patterns together. Get ready to take your pattern skills to the next level; it's time for Compound Patterns. Just be careful—your co-workers might kill you if you're struck with Pattern Fever.

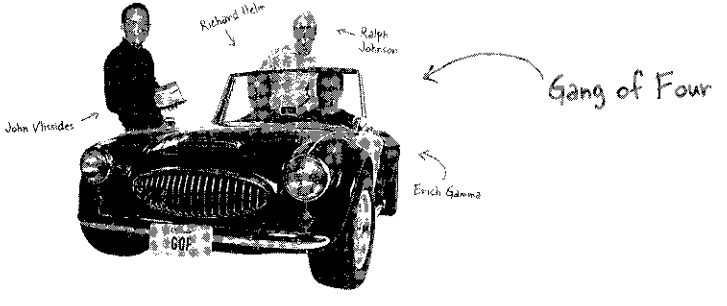




13 Patterns in the Real World

Ahhhh, now you're ready for a bright new world filled with Design Patterns. But, before you go opening all those new doors of opportunity we need to cover a few details that you'll encounter out in the real world—things get a little more complex *out there* than they are here in Objectville. Come along, we've got a nice guide to help you through the transition...





14 Appendix: Leftover Patterns

Not everyone can be the most popular. A lot has changed in the last 10 years. Since *Design Patterns: Elements of Reusable Object-Oriented Software* first came out, developers have applied these patterns thousands of times. The patterns we summarize in this appendix are full-fledged, card-carrying, official GoF patterns, but aren't always used as often as the patterns we've explored so far. But these patterns are awesome in their own right, and if your situation calls for them, you should apply them with your head held high. Our goal in this appendix is to give you a high level idea of what these patterns are all about.