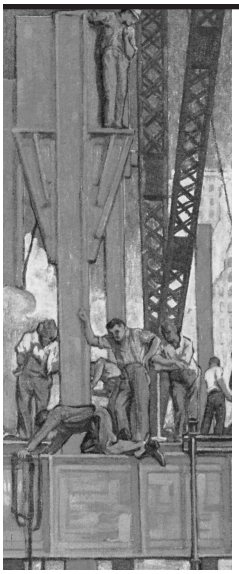

Chapter 2

Case Study

In this case study we define a neutral domain and a set of requirements for that domain. This provides a common basis from which we can explore and provide examples for each of the patterns. This neutral domain needs to have the characteristics of a business domain so that we can explore some of the unique situations, such as the split between domain and technical knowledge, that occur when developing application frameworks. It needs to be a neutral domain so that we can focus on the problems specific to frameworks and not to a particular domain. All nonfrivolous domains bring lots of baggage with them. This baggage consists of issues and practices that usually take years for experts to grasp. If we were to pick any specific, existing domain, we would have to either spend many pages teaching you the domain or ignore those important issues—much to the frustration of anyone familiar with that domain. Instead, we have picked a "frivolous" domain that we believe everyone can quickly understand and that still allows us to demonstrate and focus on the issues of developing a framework and not of a particular domain.

2.1 The Clothing Management Domain

We've chosen the family of clothing management applications from the near future as our domain. These future applications will take over the tedious task of selecting clothing to wear, keeping it clean and repaired, and replacing it when

worn out or obsolete. This domain is one that everyone should understand. We all deal with clothing. Whether it's fig leaves, togas, or blue jeans, we all manage clothes in one form or another.

Your first response may be that this isn't an interesting problem because it isn't complex enough—it is easy for you to do these things. If you are looking at one particular set of requirements, we agree. However, we need to create a framework from which we can fulfill many different sets of requirements, building applications for a variety of individuals. For example, one individual might have a very limited set of clothing (such as seven identical sets of clothing, one for each day of the week), so they need only a simple application. However, fashion models need a much more complex application since they always have to look their best—their jobs depend on it. Our framework needs to be able to support building either of these applications.

This case study focuses on requirements. The individual patterns use these requirements as a starting point for their examples and approaches.

2.2 Overview

After domain analysis and requirements refinement is completed, the following requirements are identified in the clothing management domain.

1. **Selecting—**deciding what to wear
   a. How you select clothing changes based on what you are going to do in it.
   b. Appropriateness must be checked for articles selected to be worn together.
   c. The cleanliness of an article of clothing can impact whether or not it is selected.
   d. The state of repair of an article of clothing can impact whether or not it is selected.
   e. The environment in which you plan to wear the clothing can impact the selection.
2. **Cleaning—**handling the dirty laundry
   a. Determining when an article needs to be cleaned must be customizable.
   b. For each article of clothing the cleaning method should be able to be specified.

3. **Repairing—**fixing damaged clothing
   a. Determining when an article of clothing needs to be repaired must be customizable.
   b. A process with specific customizable steps needs to be supported for deciding on and initiating repairs.
4. **Purchasing—**getting additional clothing
   a. A customizable frequency of clothing purchase and the criteria used for determining what clothing to buy must be provided.
   b. Different modes of clothing purchase need to be supported.

Let's look at each of these in more detail.

2.3 Selecting Clothing

Most people don't just pick whatever clothing they happen to come across. What factors go into selecting the right clothing? We can't address all aspects here, but we can look at enough situations to make the requirements for our framework interesting and to induce the problems that will allow us to explore the patterns.

- **What are you going to do in the clothing?** If you're going to your job as a Las Vegas blackjack dealer, you'll want (and need) different clothing than if you're going to your job as a cowboy. Otherwise when you show up dressed as a blackjack dealer at your cowboy job, you'll find that the clothing will be ruined (or destroyed) since it is not made to handle the rigors of being a cowboy. Likewise, if you show up to your blackjack dealer job dressed as a cowboy, people will be surprised and confused when you look different from all the other blackjack dealers. The requirement is that you be able to change how you select clothing based on what you are going to do in it.
- **Is each article of clothing appropriate with the others?** If you're wearing a swimsuit on your lower body, you wouldn't normally select a dress shirt, tie, and jacket for your upper body. In addition to this obvious problem, there are more subtle problems, such as wearing an orange-red shirt with pink-red pants. However, if our system is to be used by circus clowns, the definition of appropriateness is different—if clothing clashes, it's appropriate. The requirement is that you be able to check the appropriateness of the articles being selected to be worn together.

- **How clean is the clothing?** When making repairs on a truck, you know you're going to get messy, so you might choose to wear clothing that isn't clean—especially if the only other option is a white dress shirt. The requirement is that the cleanliness of the clothing can be considered as part of making the selection.
- **Does the clothing need repair?** If you've ever split a pair of pants or had an unfortunate rip in an article of clothing, you don't usually want to wear it again until it is repaired. So, just like cleanliness, the state of repair (or need of repair) can be a factor. However, this also isn't that simple. A past trend among teenagers was to rip out the knees on a pair of jeans. This takes an ordinary pair of jeans and makes them much "cooler," but it doesn't mean they need repair. The requirement here is that the state of repair of the clothing can be used as part of making the selection.
- **In what environment are you wearing the clothing?** In some parts of Europe, the accepted norm for clothing seems to be much more formal than in the United States. For example, a bright purple coat would stand out among the mainly dark brown and black coats. So, depending on whether or not you want to stand out, you could use either European selection criteria or U.S. selection criteria. Other cultural differences, too numerous to list, can impact this and have disastrous results—such as a woman wearing a bikini in Saudi Arabia. The requirement is that the environment in which you plan to wear the clothing can impact making the selection.

2.4 Cleaning Clothing

- **How often do you clean it?** It might be after two hours of use or it might be never. For normal use of the article a means of determining when it should be cleaned is needed. Frequency of cleaning depends on many factors: cultural, personal, professional, and characteristics of the item itself. A doctor has to wear clean scrubs. However, a scarf or tie can be worn several times before it needs to be cleaned. The requirement is that determining when an article needs to be cleaned must be customizable.
- **How should it be cleaned?** Once you've decided that an article needs to be cleaned you need to determine how it should be cleaned. Incorrect washing can be disastrous. For example, washing a cashmere sweater in the washing machine will probably ruin it. For the purposes of this case study, we're going to assume there are only a few fixed ways to clean an

item (wash and dry clean) and the only customization needed is the ability to specify which of these is appropriate for a particular article of clothing. The requirement is that you need to be able to specify the cleaning method on each article of clothing.

2.5 Repairing Clothing

- **Is it damaged?** Determining whether something needs repair is similar to determining selection and cleanliness. The criteria must be flexible because we don't know when something will be damaged or if it was damaged on purpose. How the article is used can impact the decision. For example, a missing top button doesn't prevent wearing a shirt on which you never button the top button. The requirement is that determining when an article of clothing needs to be repaired must be customizable.
- **How and when should it be repaired?** Once you've determined that you need to repair an article of clothing, you have to determine how you are going to repair it. There will be limitations based on the article of clothing. For example, using duct tape to repair a tear in a business suit is unacceptable, whereas it is perfectly fine for a "work on the car" sweatshirt—possibly preferable because you have duct tape easily available for fixing the car. You also have to look at the abilities and time you have for making repairs. You might not have a sewing machine or even the ability to sew. Finally, you have to decide whether it is worth making the repair. If it costs less to buy a new item, you probably shouldn't make the repair. In other words, you need to determine what kind of repairs are needed, determine how they need to get done, evaluate whether it is worth making them, and then initiate the repair. The requirement is that a process with specific customizable steps needs to be supported for deciding on and initiating repairs.

2.6 Purchasing Clothing

- **When should new clothing be purchased?** Many factors can affect clothing purchase, including available budget, the state of wear of the current wardrobe, the need to stay in fashion, and the availability of time to consider potential purchases. The framework needs to allow you to incorporate any or all of these factors into the purchasing algorithm in varying degrees and should also allow you to add your own

criteria. The requirement is that a customizable frequency of clothing purchase and the criteria used for determining what clothing to buy must be provided.

- **Where can I purchase clothing?** Framework users may want to be able to include many purchase options in their application, including retail stores, mail order catalogs, Web-based purchasing, and perhaps even personal shoppers and hand-tailored clothing. The requirement is that different modes of clothing purchase need to be supported.

Although this list of requirements could be much longer, these situations are enough to allow us to meaningfully examine the problem of providing a framework that allows applications that fulfill these requirements to be built.