Chapter XXVI

Object-Oriented Web Applications Modeling

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In this chapter we show how to design Web applications as shared views of conceptual models. We argue that Web applications are different from conventional applications because they include an additional design dimension: their hypermedia-like structure. We present the Object-Oriented Hypermedia Design Method (OOHDM), a state-of-the art approach for building Web Information systems. We stress navigational and user interface design as novel activities in development methods. Then, we address the problem of reusing design models; we introduce hypermedia frameworks as a conceptual tool to build and reuse generic models. We finally discuss navigation and interface patterns and we show how we use them to capture and convey design expertise.

INTRODUCTION

Building hypermedia applications such as interactive encyclopedias or data-intensive Web sites is a time-consuming task. We must carefully design their navigational architecture and user interface if we want them to be usable. We must understand the user tasks while he/she is navigating the hyperspace to decide which navigation facilities we should include such as indexes, guided tours, landmarks, etc. according the user needs. The interface should help the users browse through the sea of information, by giving them cues and feedback on their action, and by presenting the information in a clear and meaningful way.

However, the rapid growth of the World Wide Web has compounded the problems. Now, we have to implement navigational interfaces to corporate databases, integrating business activities with user-friendly Web front-ends to Information Systems and so on.

Web applications for electronic commerce are a good example of this kind of integration. If we take a closer look at sites such as Amazon.com or Netgrocer.com, we find that they provide a navigational view over very large databases, integrating transactional behavior (such as ordering a book or CD) with their internal processing (workflow, for example). If we consider only the design of the navigational architecture of this kind of application (i.e. the way in which different objects are connected, and the navigation facilities that the systems provides), we will have to face several challenging and complex, but interesting, design problems. To name a few:

- What constitutes an "information unit" with respect to navigation?
- What are the relationships among navigation objects and their corresponding database objects?
- How does one establish what are the meaningful links between information units?
- Where does the user start navigation?
- How does one organize the navigation space, i.e., establish the possible sequences of information units the user may navigate through?
- Which kind of indexes should we provide?
- What happens if the same object can be accessed in many different contexts?
- How can we guarantee that the user is not disoriented; how can he/she reach a "safe" home?

It is clear that we should find ways to systematize the process of building these kind of applications. Unfortunately, building applications for the hypermedia (and in particular the Web) domain involves using a myriad of different technologies, such as markup languages (like HTML or XML), scripting languages (JavaScript, Pearl), general purpose object-oriented languages (Java), etc.

We have been designing hypermedia applications using the Object Oriented Hypermedia Design Method (OOHDM) (Schwabe, 1998; Schwabe, 1996) and have modeled complex applications combining hypermedia with other kind of behaviors (Rossi, 1999 a). OOHDM considers hypermedia applications as *navigational views* over an object model and provides some basic constructs for navigation design (contexts, indexes, etc). Using OOHDM we can apply well-known object-oriented software engineering practices to the construction of applications involving navigation.

In this chapter, we present the OOHDM modeling approach. First, we analyze why current modeling approaches are not adequate for Web applications. Next, we introduce the OOHDM development framework and discuss navigation and user interface design. We then discuss the problem of reusing design models and design expertise. Some further work is finally presented.

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