Chapter II

Structural Media Types in the Development of Data-Intensive Web Information Systems

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ABSTRACT

In this chapter, a conceptual modeling approach to the design of web information systems (WIS) will be outlined. The notion of media type is central to this approach. Basically, a media type is defined by a view on an underlying database schema, which allows us to transform the data content of a database into a collection of media objects that represent the data content presented at the web interface. The view is extended by operations and an adaptivity mechanism, which permits the splitting of media objects into several smaller units in order to adapt the WIS to different user preferences, technical environments and communication channels. The information entering the design of media types is extracted from a previous story boarding phase. In consecutive phases, media types have to be extended by style patterns as the next step toward implementation.
INTRODUCTION

In this chapter, we address the conceptual modeling of web information systems following the abstraction layer model that was already presented in another chapter of this book (Kaschek et al., 2003). We concentrate only on the structural aspects, i.e., operations will not be discussed. Thus, the central task will be the specification of the data content that is to be made available on the Web. The goal is to provide conceptual means for describing the content in a way that it can be tailored to different users, different end-devices and different communication channels without designing multiple systems.

The chapter will guide the reader through a three-layer model of describing such data. Describing the structure of the data as it is presented on the Web will lead to defining the structure of media types. However, these structures will be full of redundancies and, thus, hard to maintain as such. Therefore, the data has to be restructured in order to define a suitable database schema, which defines the second layer. As database design follows different objectives, the content specification should lead to views, i.e., transformations, which turn the content of a database into the content of a media type. The third layer is made up by data types, i.e., immutable sets of values that can be used in the description of the other two layers.

Thus, a media type will basically be defined by a view on an underlying database schema, which allows us to transform the data content of a database into a collection of media objects that represents the data content presented at the web interface. Then, we extend media types in a way that they become adaptive to users, devices and channels. The adaptivity of a media type permits the automatic splitting of media objects into several smaller units, allowing a user to retrieve information, in a step-by-step fashion, with the most important information presented first. The reader will see two different ways to specify which data should preferably be kept together, and how this will impact on the splitting of media objects.

The result of conceptual modeling will be a media schema, i.e., a collection of media types, which adequately represents the data content of the story board. In this chapter, we will formalise this idea of conceptual modeling of web information systems by the use of media types. In the remainder of this chapter, we will first look at related work on conceptual modeling of web information systems. This will provide the reader with the necessary framework of the theory of media types. In a second step, we will illustrate in detail, but quite informally, the central ideas underlying media types. This is to convince the reader about the naturalness of the approach. The third and fourth steps are
Integrating Accessibility Evaluation into Web Engineering Processes
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