



Chapter XXII

HMT: Modeling Interactive and Adaptive Hypermedia Applications

Peter Zoller
FORWISS, Germany

Methodologies for modeling hypermedia applications are a comparatively young, but nevertheless very promising area of current research. The rapid change of techniques and standards for the Internet, together with the explosive growth of both number and size of websites, demands a high-level conceptual framework for designing hypermedia systems. However, existing approaches focus only on information presentation, but neglect aspects like interactivity or content adaptation.

This chapter presents the Hypermedia Modeling Technique (HMT), a new methodology for designing truly interactive and adaptive hypermedia applications. HMT allows to model sophisticated search interfaces offering interactive query refinement, interfaces for manipulating the underlying data source, and adaptive hypermedia documents. HMT is partly based on the Relationship Management Methodology (RMM), but has been enhanced regarding both design process and data model.

INTRODUCTION

More than other applications, information systems in the World Wide Web are subject to frequent changes for various reasons. External influences, like new browsers, servers, or standards as well as internal changes in a company's structure,

corporate identity, or services offered demand a high-level, robust, efficient, and flexible modeling technique when building hypermedia applications.

One of the methodologies addressing this problem is the Relationship Management Methodology RMM (Isakowitz et al., 1997). Since its introduction in 1995, RMM has become a well-known and popular methodology for designing hypermedia applications which is especially suited for database driven systems. It provides both a seven-step methodology for designing application systems and a specific data model, the *Relationship Management Data Model* (RMDM), which is based on HDM (Garzotto et al., 1993) and the Entity-Relationship model (Chen, 1976). When creating an application using RMM, the first step is to model the application domain as a common ER-diagram. Based on this ER-Model, *m-slices* are used to define the units of presentation. Each *m-slice* (except for empty slices) is bound to a specific entity and may contain attributes, access structures like indexes and links, or other *m-slices* thereby allowing nested slice structures.

But while RMM, as well as other methodologies, focuses only on information representation, next generation approaches should additionally address the aspect of interactivity. During several projects with database driven web information systems (WIS), we experienced that interfaces for querying and maintaining the system's data sources are often a basic requirement of such applications. On the one hand, this includes the capability of modeling query interfaces and components for populating and maintaining the underlying data source. On the other hand, creating interfaces allowing to manipulate data on the server inevitably requires a solid authorization concept. Considering the frequent changes typical for hypermedia applications and looking for maximum consistency, authorization aspects should also be covered by the modeling methodology.

As described by Christodoulou et al. (1998), none of the current hypermedia design methodologies provides these features, although they are essential for a lot of WWW applications. HMT has been developed to close this gap. It is partly based on the Relationship Management Methodology and offers an extended and more powerful slice concept. We distinguish between documents (equivalent to top level *m-slices* in RMM) and element-groupings (corresponding to lower level *m-slices* of RMM), and offer a new set of domain primitives (typed documents) for modeling interactive documents like query or input documents. In addition to this, a new concept for defining access restrictions and roles is introduced. Depending on the level of application (document level / element level), these access restrictions can be used for traditional access control as well as for the creation of adaptive documents. While roles and access structures have recently been added to our design methodology, most of the other features have already been implemented in a CASE-Tool called WebCon used to design real world applications (Zoller and Sommer, 1998; Sommer and Zoller, 1999).

The remainder of this chapter is organized as follows: the next section gives an overview of the HMT design process, then the next group of sections discuss the different design steps, and the last section closes this chapter with conclusions.

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