Chapter X
Semantic Composition of Web Portal Components

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ABSTRACT

Many recently emerging component-based Web portal application platforms allow end users to compose dynamic Web dialogues on the fly. Experts predict that this paradigm will enable a class of new applications for Web-based content delivery in information-rich, agile business domains, such as health care. We present a conceptual analysis of the user-based composition paradigm currently used and argue that its usability is limited with respect to complex, dynamic applications. To overcome these limitations, we present an alternative composition paradigm, which is based on a semantic model of a portal's application domain. We evaluate this approach with an application scenario in the health care domain.

INTRODUCTION

With much ambiguity, the term "Web portal" has been used for years to refer to Web sites that provide "starting points" (or "gateways") for Web users of a particular service infrastructure (e.g., MSN, AOL, Yahoo) or for users interested in a particular subject (e.g., investment, health care, technology).

Early Web portals were little more than frequently updated or database-driven Web pages and users had only very limited options for personalising the information content provided. Since then, portals have become increasingly customisable. Many current portal sites provide the means to personalise information content and to customise the way in which this content is rendered on the screen.

Recently, there has been an increasing trend of employing Web portals within organisations to provide a unified and personalised user interface for all relevant information content, and to facilitate collaboration in virtual enterprises. The metaphor of a digital "dashboard" has been coined to describe such intranet portals, which enable users to choose from a gallery of information components in order to customise their individual information delivery (Harmon, Conroy, Emory, & Macfarlane, 2000). A number of dedicated portal server technologies have been developed by software vendors such as Sun Microsystems, Microsoft, IBM, Bea, and the open source community. Such portal servers implement extensible frameworks for a new kind of software component. We will refer to these components as *Web portal components* (WPCs) in order to avoid vendor specific terminology such as Web parts (Baron, 2003), portlets (Buckner, Hesmer, Fischer, & Schuster, 2003), or modules (DNN, Rainbow) (Schultes, 2003).

An innovative feature of WPC technology is based on *end-user composition* of Web sites. Moreover, in some WPC models, users not only visually compose pages of WPCs with their Web browsers but they can also create connections between the interfaces of these components in order to let them exchange data. This feature carries great promise because it empowers users, in principle, to construct *integrated* forms based on WPCs.

While current WPC technology is satisfactory for simple applications and relatively static portal pages (i.e., pages that are largely predefined and modified infrequently), a number of problems arise with complex, more frequently modified portal applications. As an example for such an application,

we have been studying the Web based delivery of electronic medical record (EMR) services to health care professionals. The challenge in developing EMR applications consists of the large variety of potentially important information dialogues and forms. Moreover, physicians have different specialisations and preferences about their interaction with EMR information content. At first glance, WPC technology appears to be an ideal platform for building EMR applications, because it enables caregivers to compose personalised medical patient records. However, "on-the-fly" composition of WPC-based pages turns out to be difficult and error-prone in practice.

The main cause for this limitation is that WPC event interfaces are not semantically typed. This may result in a confusingly large number of technically possible event connections offered to the user during WPC composition. In this chapter, we present an approach to overcoming this limitation by associating semantic concepts with WPC event interfaces. This approach allows us to shift the WPC composition paradigm from the technology domain (which is unfamiliar to most end users) to the actual application domain of the portal user. Rather than creating event connections among WPCs, the user can simply specify a domain-specific *context information model,* which serves as input for creating the connections among WPCs.

The next section will discuss how the new WPC paradigm relates to other component technologies for the Web. In the third section, we conceptualise the event composition model in current WPC platforms and discuss its limitations for dynamic applications, in which end users frequently need to compose new portal pages on-the-fly. The fourth section represents the technical core of this chapter: we present an approach to facilitating end-user-driven composition of portal pages by moving the WPC composition paradigm from a technological level to a domain-oriented level. A case study for applying this approach is discussed in the fifth section. The final two sections close with a comparison of related

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