

Web Portal Application Development Technologies

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INTRODUCTION

The growth of the Internet and the World Wide Web has contributed to significant changes in many areas of our society. The Web has provided new ways of doing business, and many companies have been offering new services as well as migrating their systems to the Web.

The main goal of the first Web sites was to facilitate the sharing of information between computers around the world. These Web sites were mainly composed of simple hypertext documents containing information in text format and links to other documents that could be spread all over the world. The first users of this *new technology* were university researchers interested in some easier form of publishing their work, and also searching for other interesting research sources from other universities.

After a few years the popularity of the Web increased significantly, especially after the creation of user-friendly Web browsers and Internet services providers. Home users started to get interested in accessing the Web, and many companies saw this as a major opportunity for offering their products and services. The new idea was not to use the Web as a collection of simple static Web pages, but as a way of providing richer dynamic content to the user, such as graphics, images, sounds, videos, and so forth.

The demand for complex services such as online banking, e-commerce, e-learning, and business-to-business transactions was made possible due to the evolution of Web site construction technologies. Technologies such as script languages (e.g., JavaScript), server side technologies (e.g., JSP, ASP, CGI), and middleware (e.g., Corba, EJB, Web Services) enabled the construction of Web applications whose context could be generated dynamically, and were able to perform operations such as queries and updates in a database.

These emerging technologies contributed to a scenario where a new kind of application began to grow in popularity, Web portals. The main idea of a Web portal was to provide an integration point of access to information, applications, and people (Bellás, 2004; Ruby & Christopher, 2003; Wege, 2002). Therefore, a portal offered users, at the same place, the capabilities of seeing the most recent news, executing searches, and also shopping.

The evolution of capabilities provided by Web portals, such as content management, personalization for different users and groups of users, collaboration, and security, imposed difficulties for Web portal developers. The main challenges faced by the developers were:

- How to integrate different applications inside the intranet and also over the Internet
- How to provide specific content to different kinds of users and how to categorize users in groups and provide the necessary information
- How to obtain the information from other partners, or service providers, over the Web
- How to gather and tailor the information to the specific target users
- How to secure the access of different kinds of users

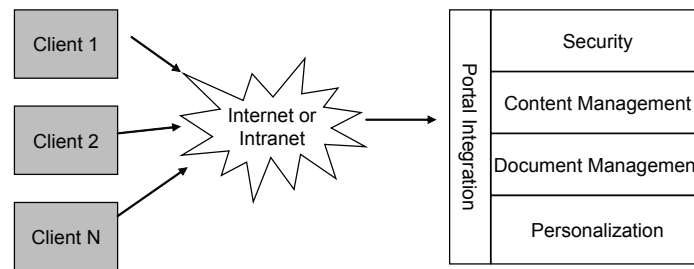
In order to address some of these issues, specific tools and platforms have been developed to facilitate portal construction, management, and operation. The main goal of this article is to provide a detailed description of the state of the art technologies, standards, and tools for Web portal engineering.

BACKGROUND

A portal provides a common gateway to access information, applications, and services over the Web. A lot of companies use portals as a means of integrating their intranet applications to simplify business processes within the organization, enabling cost and time effectiveness. Moreover, companies also extend this idea with their business parties to the extranet environment, where they can provide solutions to facilitate their transactions, for example, simplifying chains of operations in business to business. A basic architecture of a portal is shown in Figure 1.

Some of the services shown are common to several portals and a brief explanation is provided. (For more details see Dovey, 2001.)

Figure 1. Basic portal architecture



- **Content Management:** A portal contains information from different sources, and the information can be updated very frequently. Therefore, a portal should provide an easy way to change its content, while at the same time try to automate whatever is possible by providing tools to facilitate updates to users, as well as implementing automatic services that capture information updated in remote sites (e.g., newsletters, other portals, etc.).
- **Content Syndication:** Syndication services interact with information sources (content providers) via an appropriate protocol. Content providers offer their content in standardized formats such as rich site summary (RSS), news industry text format (NITF), NewsML, and Extensible Markup Language (XML).
- **Personalization:** The main goal of personalization is to provide a means to present the information based on the user profile, enabling customizations in content and appearance for different kinds of users or groups of users. The portal can also enable the user to define his/her own personalization features, providing him/her functionalities to select what services s/he wants to view, and also facilitating reconfiguration of GUI regarding positioning and color of elements (pages, frames, links, etc.).
- **Collaboration:** This service aims at providing a set of functionalities that can leverage the communication between the users of the portal, such as discussion lists, chats, and newsgroups.
- **Security:** This is a vital concern for a Web portal. The portal should provide ways for authenticating and controlling user access to information and applications. It is also important to control how the information is stored and exchanged with the portal by using mechanisms such as cryptography.

Not all portals provide all services described. There are many technologies and tools that can facilitate the construction of portals by providing easy ways to implement the previous services. This will be discussed later in this article.

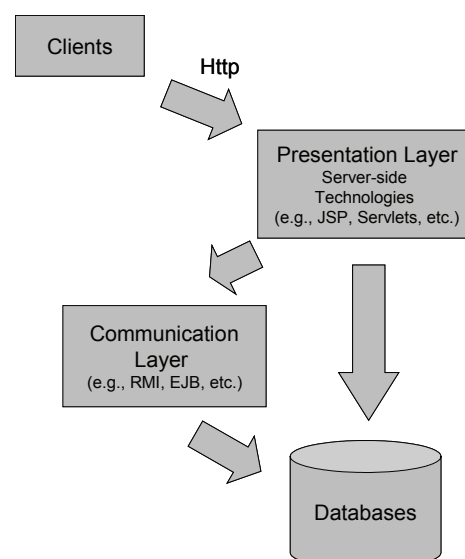
The main services of portals described in this section form a cornerstone in the understanding of Web portals. The complexity in Web portal development increases with the level of detail and number of services the portal offers, as well as the intended audience. Therefore, these concepts are vital to understand what a portal can offer and for whom its services will be most suited.

WEB PORTAL DEVELOPMENT

Basic Technologies

When considering Web portal development, one comes across a set of basic Web technologies that are widespread in different kinds of Web applications. Figure 2 shows a common architecture for Web applications based on Java technologies.

Figure 2. Web application architecture



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