



Chapter 4

Expert Database Web Portal Architecture

Anthony Scimé

State University of New York College at Brockport

ABSTRACT

The volume of data available on the World Wide Web makes it difficult for a domain novice to find reliable, accurate information. Such a novice may call upon a domain expert for information and advice. On the Web, this expert advice can be organized as an expert database behind a Web portal for the domain. The creation of such a database requires an architecture that captures the expert's domain knowledge and finds and evaluates applicable Web pages from which data is extracted. This chapter outlines the components of an expert database Web portal, its design, and population.

INTRODUCTION

One of the advantages of the World Wide Web is that information is available in virtually every domain. This information, however, must be found to be of value. Two general methods of finding information on the Web are to conduct a search and to access a Web portal. A Web search is typically conducted by the use of a search engine. A Web portal provides access to information in a specific domain. The Web portal maybe a domain-specialized search engine or a Web-accessible domain specific database. The specialized search engine portals are search engines with search indices for Web pages in the specific domain. These portals are sometimes referred to as consumer portals (Bordner, 1999). The database Web portals, also known as commerce or industry portals (Bordner) or knowledge portals (Staab & Maedche, 2001), provide information on the domain collected from specific sources in advance of the searcher's request. This database Web portal approach to accessing information is especially useful for the novice searcher unfamiliar with the domain being accessed (Bordner; Maedche & Staab, 2001).

To access information on the Web, a user must either know the URL of desired pages, or find pages with the needed information by some search process. Searching for Web pages requires the user to be able to express his/her information need in terms understandable to the search engine. That is, the searcher must choose keywords. The search engine must

recognize the keywords as keywords representing Web pages that will satisfy the searcher's information need (Hoelscher & Strube, 1999; Lawrence & Giles, 1999; Turtle & Croft, 1996). After conducting a search, the searcher must have sufficient knowledge to determine the validity of the found pages and be able to sift through the excessive volume typically returned by search engines (Hoelscher & Strube). The sheer volume of pages makes it difficult to find comprehensive and valid pages on the Web for any given information need (Lawrence & Giles).

On the Web, the process of searching for information that is new to the searcher is difficult. The novice domain searcher does not know the keywords necessary to achieve the desired result. Most searchers limit the keyword search to one or two keywords and search within a single search engine (Hoelscher & Strube, 1999). The search typically ranks the resulting hits. Ranking brings to the top of the results list the Web pages that most closely match the searcher's keyword query. The results of most searches may be flawed, because the searcher is not expert in developing quality query expressions. Nor, do most searchers select a search engine based on the domain to be searched (Hoelscher & Strube). Searcher frustration, or more specifically a searcher's inability to find the information he/she needs, is common.

The lack of domain context leads the novice to find a domain expert, who can then provide information in the domain and may satisfy the novice's information need. The domain expert should have the ability to express domain facts and information at various levels of abstraction and provide context for the components of the domain. This is one of the attributes that makes him or her the expert (Turban & Aronson, 2001). Because the novice has no personal context, he/she uses the expert's context. A domain expert database Web portal can provide domain expertise on the Web. In this portal, relevant information has been brought together—not as a search engine, but as a storehouse of previously found and validated information.

The use of an expert database Web portal to access information about a domain relieves the novice searcher of the responsibility to know about, access, and retrieve domain documents. A Web mining process has already sifted through the Web pages to find domain facts. This Web-generated data is added to domain expert knowledge in an organized knowledge repository/database. The value of this portal information is then more than the sum of the various sources. The portal, as a repository of domain knowledge, brings together data from Web pages and human expertise in the domain.

EXPERT DATABASE WEB PORTAL OVERVIEW

An expert database-driven domain Web portal can relieve the novice searcher of having to decide on validity and comprehensiveness. Both are provided by the expert during portal creation and maintenance (Maedche & Staab, 2001). To create the portal, the database must be designed and populated. In the typical database design process, experts within a domain of knowledge are familiar with the facts and the organization of the domain. In the database design process, an analyst first extracts from the expert the domain organization. This organization is the foundation for the database structure and specifically the attributes that represent the characteristics of the domain. In large domains, it may be necessary to first identify topics of the domain, which may have different attributes from each other and occasionally from the general domain. The topics become the entity sets in the domain data model. Using database design methods, the data model is converted into relational database tables. The expert's domain facts are used to initially populate the database (Hoffer, George,

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