Efficient Web-Based Navigation of the Foundational Model of Anatomy

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The University of Washington's Foundational Model of Anatomy (FMA)[1] is a complex, frame-based model composed of over 170,000 frames collectively specified by more than 1.4 million slot values. The Foundational Model Explorer (FME) was designed to provide simple and intuitive web access to this complex knowledge base.

The Foundational Model Explorer (FME) (Figure 1) is built upon the Protégé 2000 knowledge base access library [http://protege.stanford.edu/]. The FME application, associated libraries, and the FMA database all reside on remote servers. Users of the FME are not required to download, install, or set-up any of these components. The FME application, in response to a query, retrieves the appropriate information from the FMA, formats these data into html documents, and transmits them, via the Internet, back to the client where they can be viewed from any standard web browser (Figure 2).
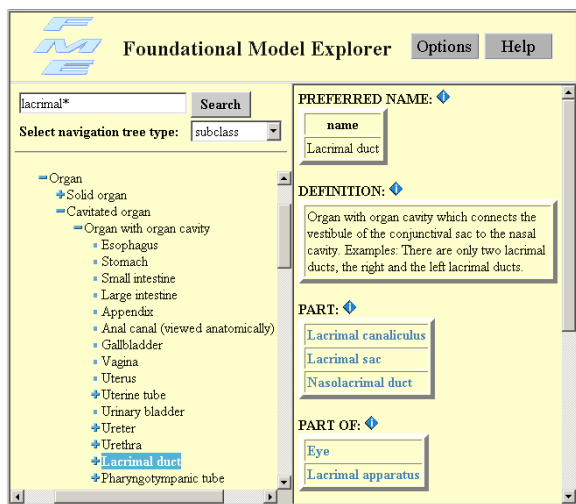

Figure 1: FME Interface

In order to minimize browser incompatibilities the FME was designed almost entirely free of client-side code through the use of Java Servlets and Java Server Pages (JSP) in conjunction with the Jakarta Tomcat Servlet container [http://jakarta.apache.org/tomcat/].
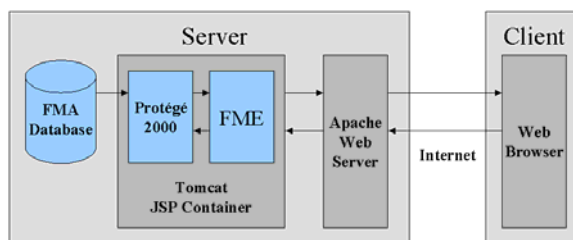

Figure 2: FME Deployment

The FME provides several hierarchical trees for concept navigation. In order to ensure that the FME operates efficiently, all of the hierarchies are pre-generated and maintained in server memory. All clients share a common instance of these trees. However, the server maintains individual view information for each client. This view information specifies which hierarchy the client is currently using and the state of each visible node (i.e. expanded or collapsed).

Retrieving concept information is made efficient through the utilization of a pre-fetch extension to the Protégé 2000 system (generously provided by Jack Keel, University of Wisconsin). This addition minimizes database retrieval operations by attempting to anticipate and retrieve, in advance, the next data that the user will request.

Because the FMA knowledge base is so large, uninitiated users can find concept location difficult. For this reason, the FME provides a search facility that translates common synonyms, in English or Latin, into the FMA's preferred concept name. In addition, it enables wild card searches (those matching a partial pattern), when the exact term is not known. For more information see http://sig.biostr.washington.edu/projects/fm/FME/index.html.

References
1. Rosse C, Shapiro LG, Brinkley JF. The Digital Anatomist Foundational Model: Principles for Defining and Structuring its Concept Domain. Proceedings AMIA; 1998. p. 820-824.