KAON SERVER — A Semantic Web Management System

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Along with the rise of the next-generation web, the Semantic Web, ontologies and metadata building on RDF will become standard technologies for web and e-commerce applications. In order to be able to deploy ontologies and ontology-based metadata in a large scale, new scalable and reliable solutions are demanded, that meet enterprise demands. This article presents such a solution, namely KAON SERVER, an on-going project intended to provide a transactional, multi-user-capable and secure Semantic Web management system.

As experience gathered in first Semantic Web applications shows, both core technologies of the Semantic Web, that is ontologies and metadata, are usually created in a collaborative and incremental way. This poses a major challenge for systems intended to manage Semantic Web data, such as repositories and inference engines, as data must be updatable in a concurrent way. In a nutshell, the major issues that have to be addressed are persistence, transactions and security.

Unlike existing read-only Semantic Web management systems (SWMS) such as Sesame [1] and RDFSuite [2], which focus on querying stored data and do not provide any means for actually updating stored data beyond throwing away the old and uploading the new, our central target is updatability. This enables using the system within other systems not only to delegate data logic but also to integrate applications providing real collaboration among its users.

Delegate data logic

The current approach of Semantic Web applications consists of loading their data from (network-reachable) files or read-only SWMS, process the data in some way, and store it back to files or upload it back into the read-only SWMS. The usage of KAON SERVER offers several benefits: First, it supports transactions, which allows the application to undo (parts of) the course of actions of the application. Second, it removes the need to continuously load and save data, since all content is stored in KAON SERVER and is immediately accessible, e.g. with the integrated web interface..

Integration of applications.

The web interface allows other applications that consume the metadata from your Semantic Web applications to retrieve current data via the Web thereby realizing the loose, asynchronous, read-only coupling of systems using data exchange languages which is the predominant form of communication within the current Web.

While the usage of KAON SERVER via its web interface already increases the synchrony of information processed in such loosly integrated systems, the embedding of KAON SERVER allows even closer integration as data can be updated. For example, the KAON

Figure 2: KAON SERVER Architecture

PORTAL web application depicted in figure 1 provides a web-based system for ontological search and browsing which instantaneously presents the information that has been edited by a couple of users modelling an ontology with KAON SOEP.

Providing collaboration

Of course, the modellers using KAON SOEP can collaboratively work on the same ontology as transactions are provided. Many other Semantic Web scenarios are intrinsically collaborative. Consider for example Semantic Annotation: of course people can only annotate a page at a time, while having to know the results of the efforts of others. The current asynchronous approach often leads to duplicate definitions (with distinct identifiers) as not all annotations are visible to the annotator.

Embedding legacy systems

Especially in enterprise scenarios applications live in a complex environment that evolved over time. The Semantic Web has to integrate existing systems to become a success such as todays web took off commercially once templating technologies were able to generate HTML from existing corporate data sources. Thus KAON SERVER can integrate data from existing relational data sources by interpreting mappings that align database content with given ontologies. The mapping descriptors can be graphically defined using KAON REVERSE [4].
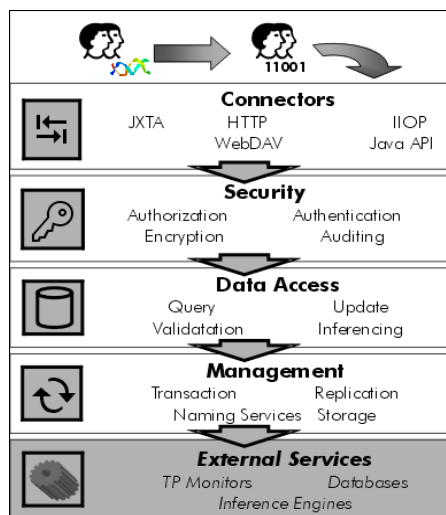
The future of KAON SERVER

While the above corresponds to the status of KAON SERVER as it can be downloaded in May 2002 from kaon.semanticweb.org. we will address the following aspects in the near future:

First, we will complete the KAON SERVER architecture, which is depicted in figure 2. In the communications layer we will add support for WebDAV, which is an HTTP extension that allows to edit metadata over the web. Eventually, the system will also be accessible in peer-to-peer environments using the Java JXTA protocol.

An important feature for enterprice scenarios will be provided by the security layer, which will authenticate users, provide secure communication and proper authorization.

The data access layer will be significantly extended and offer a native query facility besides the already integrated SiLRi [3] Datalog and F-Logic engine. Along these lines we will integrate other external services to provide access to rule-based and description-logic-based inference services.

Conclusion

KAON SERVER is a scalable Semantic Web management system that offers unique possibilites for building integrated Semantic Web applications. It is open-source and can be adopted for individual needs. Its close integration with other KAON tools, such as the ontology editor KAON SOEP, the database-reverse-engineering tool KAON REVERSE and the Semantic Portal [5] framework KAON PORTAL offers the most complete suite of freely available Semantic Web tools.

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References

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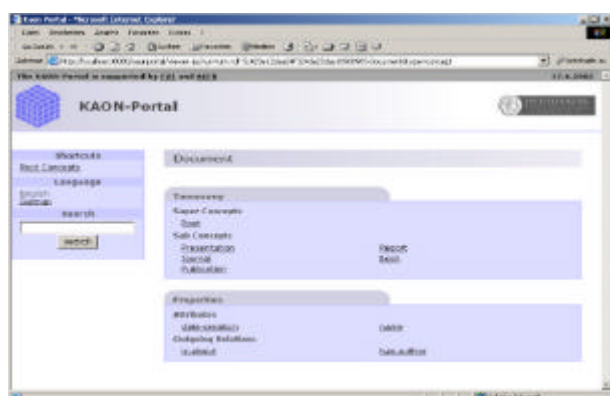
Figure 1: KAON Portal operating on KAON SERVER