KAON SERVER

AN APPLICATION SERVER FOR THE SEMANTIC WEB

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Application servers provide many functionalities commonly needed in the development of a complex distributed application. So far, the functionalities have mostly been developed and managed with the help of administration tools and corresponding configuration files, recently in XML. Though this constitutes a very flexible way of developing and administrating a distributed application, e.g. an application server with its components, the disadvantage is that the conceptual model underlying the different configurations is *only implicit.* Hence, its bits and pieces are difficult to retrieve, survey, check for validity and maintain.

To remedy such problems, we here present an ontology-based approach to support the development and administration of software components in an application server. The ontology captures properties of, relationships between and behaviors of the components that are required for development and administration purposes. The ontology is an *explicit* conceptual model with formal logic-based semantics. Therefore its descriptions of components may be queried, may foresight required actions, e.g. preloading of indirectly required components, or may be checked to avoid inconsistent system configurations — during development as well as during run time. Thus, the ontology-based approach retains the original flexibility in configuring and running the application server, but it adds new capabilities for the developer and user of the system.

The proposed scheme resulted in an infrastructure called *Application Server for the Semantic Web* that additionally facilitates plug'n'play engineering of ontology-based modules and, thus, the development and maintenance of comprehensive Semantic Web applications. The infrastructure is implemented in a system called *KAON SERVER* which is part of the KArlsruhe ONtology and Semantic Web Toolsuite (KAON) `http://kaon.semanticweb.org`. We made use of the Java Management Extensions (JMX) — an open technology for component management. With JMX it becomes possible to configure, manage and monitor Java applications at run time, as well as break applications into components that can be exchanged. Basically, JMX defines interfaces of managed beans (*MBeans*) which are Java-Beans that represent JMX manageable resources. MBeans are hosted by an *MBeanServer* which allows their run time deployment and manipulation. All management operations performed on the MBeans are done through interfaces on the MBeanServer.

JMX only provides an API specification with several available implementations. We have chosen *JBossMX* which is the core of the open-source JBoss application server that augments J2EE by dynamic component deployment. This choice allows us to inherit all the functionality provided by JBoss in the form of its MBeans (Servlet Containers, EJB Containers etc.). We deploy our inference engine as an additional MBean and augment the existing component loader and dependency management to exploit the inferencing. A version and security management tool allows to browse and query the ontology at run time. Thus, it is possible to use the KAON SERVER as a "semantically enhanced JBoss".