A Web Services Architecture for UMLS Knowledge Sources

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Abstract

A web service is a collection of industry standards to enable reusability of services and interoperability of heterogeneous applications. The UMLS Knowledge Source (UMLSKS) Server provides remote access to the UMLSKS and related resources. *We propose a Web Services Architecture that encapsulates UMLSKS-API and makes it available in distributed and heterogeneous environments. This is the first step towards intelligent and automatic UMLS services discovery and invocation by computer systems in distributed environments such as web.*

A Web Service (Figure 1) is a software system designed to support interoperable machine-to-machine interactions over a network of distributed and disparate systems. It has an interface described in a machine-processable format (specifically WSDL). Communication is performed via SOAP, an XML-based mechanism for exchanging typed information. Web services allow software and services from different entities on the web to be integrated and reused by other applications, regardless of their development. This can be a basis to provide novel services based on existing resources (such as legacy applications) on the web. W3C is developing Web Services Architecture and relevant standards as the future framework for cross-platform interoperability. Web Services working group at W3C is establishing a Web Services Choreography Architecture to enable functional and coherent interlink between distributed systems through web services model. This will be a language that allows more complex composition of interdependent Web Services allowing advanced automation and intelligent application integration.

Currently, UMLSKS Application Programmer Interface (UMLSKS-API) provides access to the UMLSKS and related resources on the Internet. Approximately 40 API methods have been defined allowing access to all details of the Metathesaurus. The UMLSKS-API should be downloaded or directly called by each application separately. This infrastructure, although provides cross-platform access to the UMLSKS (i.e., Java and non Java applications) over the internet, but lacks component reuse and intelligent and automated service discovery and invocation. Although Java RMI is optimized in connection oriented communications, the protocol is language specific and constraints data-structures and interfaces. In contrast, Web Services (application-to-application) are based on the ubiquitous technologies that have grown up to support distributed services on the web. Web Services communications use HTTP which is universally supported, and can effortlessly pass through firewalls.

We have developed a prototype of such UMLS Web Service which implements most commonly used UMLSKS use cases. This is developed in the context of our current public health information integration systems and now is available globally to be immediately, transparently and securely reused by any other application over the web. The result is an interoperable, reusable, and ubiquitous integrated Web Service.
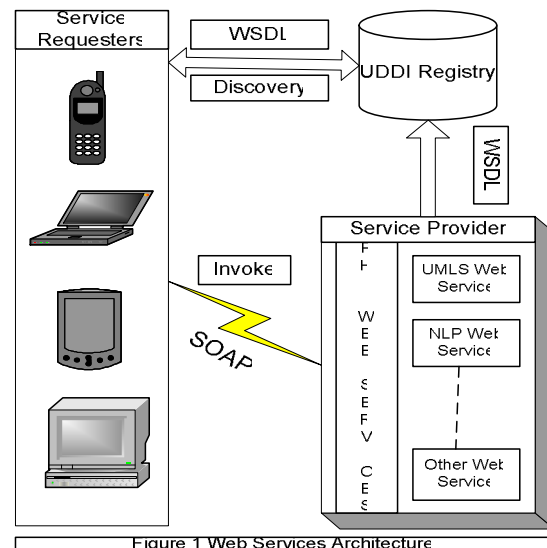

Figure 1 Web Services Architecture

Future work

We are moving towards a Semantic Web Web Services (SWWS) framework for providing ontology driven service discovery, based on Semantic Web technology. Once the appropriate standards are finalized and available (by W3C Semantic Web Services Initiative), this will enable intelligent and automated discovery, negotiation and invocation of UMLSKS services by remote systems in the context of their particular use and without human interaction and extra programming and only when there is a need.