ABSTRACT

The main criteria for the successful use of Semantic Web technologies are a user-friendly and intuitive design of user interfaces (especially for web applications) and an acceptable performance with regard to the production, processing and publication of semantically represented data. Data management schemata used in the Semantic Web (Triple Stores) generally offer a high degree of flexibility for the management of information by means of RDF graphs, taxonomies, vocabularies or ontologies. However, this aspect is accompanied by challenges concerning the usability and performance in the development of Semantic Web applications, especially when complex information structures and corresponding queries have to be processed. Therefore, if priority is given to easing the use and performance of the software, development risks have to be taken into account. To minimize these risks, this thesis proposes a categorization model which can be used to assist in the specification of requirements. Furthermore, approaches are presented that foster the reduction and optimization of SPARQL queries on the application side, and thus positively influence the process of run-time optimization of Semantic Web applications. Dedicated strategies are developed for the exploration and visualization of specific data modalities, such as spatial, statistical, and multilingual data. Based on these concepts, software components are developed, optimized and integrated into existing web applications. The approaches elaborated in this work are evaluated by using the Berlin SPARQL Benchmark as well as Web applications from different domains such as tourism, finance and statistics.