Chapter 9
Semantic Web-Based Framework for Scientific Workflows in E-Science

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ABSTRACT

In the future generation, computer science plays prominent role in the scientific research. The development in the field of computers will leads to the research benefits of scientific community for sharing data, service computing, building the frameworks and many more. E-Science is the active extending field in the world by the increase data and tools. The proposed work discusses the use of semantic web applications for identifying the components in the development of scientific workflows. The main objective of the proposed work is to develop the framework which assists the scientific community to test and deploy the scientific experiments with the help of ontologies, service repositories, web services and scientific workflows. The framework which aims to sustenance the scientific results and management of applications related to the specific domain. The overall goal of this research is to automate the use of semantic web services, generate the workflows, manage the search services, manage the ontologies by considering the web service composition.

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INTRODUCTION

The massive data leads to increase in E-science activities in the business world. The activities pose a hazard challenges such as scheduling the jobs, and how to maintain the interoperability among the services and tools (N. Ravindran, et. al., 2010).

The real time issues will be addressed by workflow technologies in the e-science context by executing the experiments with massive data available in the repositories (E. Pignotti, et. al., 2008). The implementation of scientific workflows in the multidisciplinary is increasing with massive volume of data and services. The enormous tools help in executing the tasks in heterogeneous environment with significant improvement in execution time. The e-learning workflows by web service semantics makes the system not only reliable, scalable and computer processable but also computer interpretable. To improve the precision and recall, the search engine should point out relevant pages through machine processable information (G. Stumme, et. al., 2006).

The semantic search plays a crucial role in finding the exact resources on which the service and data is going to process. A workflow is a formal model in which the services or tasks are composed and coordinated to achieve the desired operation. The services are residing in different locations with various configurations are often very large by its workflow sequence.

The web service in semantic web service composition is a self-contained, loosely coupled process, deployed over standard middleware platform that can be described, published, discovered and invoked over a network (S. Bharath Bhushan, and Pradeep Reddy, CH, 2016).

The sematic web services in e-science have three key areas of concern which are service discovery, mediation and composition. In service discovery we have to find a service that matches with the given task from similar service repository. The composed service compatibility will be taken care in meditation phase. In order to satisfy the user, the group of service should compose to meet the business goal in the final phase of the workflow. The ontologies applied in workflows in which they achieved significant results are discussed in (Fensel, D., et. al., 2006, and OWL-S, 2006).

The semantic web is created by applying ontologies to the web, where it provides the knowledge base to develop the web service and workflows. The knowledge sharing and reuse can be achieved through ontologies (D. Fensel, et. al., 2001).

The personalization plays a crucial role in the e-learning system where the customer feedback is important criteria. The e-learning system will deliver the services according to their user preferences through continuous feedback.

To enable the e-science in service computing, we have two notable technologies by processing web services. They are International Virtual Observatory Alliance