Chapter XIX
The Key Requirements for Deploying Knowledge Management Services in a Semantic Grid Environment

Mirghani Mohamed
The George Washington University, USA

Michael Stankosky
The George Washington University, USA

Vincent Ribière
The George Washington University, USA

ABSTRACT

The purpose of this article is to investigate the requirements of knowledge management (KM) services deployment in a Semantic Grid environment. A wide range of literature on Grid Computing, Semantic Web, and KM have been reviewed, related, and interpreted. The benefits of the Semantic Web and the Grid Computing convergence have been enumerated and related to KM principles in a complete service model. Although the Grid Computing contributed the shared resources, most of the KM tool obstacles within the grid are to be resolved at the semantic and cultural levels more than at the physical or logical grid levels. The early results from academia show a synergy and the potentiality of leveraging knowledge at a wider scale. However, the plethora of information produced in this environment will result in a serious information overload, unless proper standardization, automated relations, syndication, and validation techniques are developed.
INTRODUCTION

Grid Computing is a significant reform in enterprise computing and is expected to bring unprecedented benefits on leveraging of knowledge management (KM) processes and procedures. The very fundamental objective of grid physical network is to speed information flow through improved processing, storage, discovery, retrieval, acquisition, and sharing within expansive colossal social networks. Grid Computing synchronizes computer resource sharing and effective deployment, which helps in faster assimilation, representation, and propagation of knowledge. Grid Computing has shown a notable success, however, it is restricted to collaboration amongst scientists and researchers in mainly what is known as the e-Science community. Accordingly, the early implementation of Grid Computing put an emphasis on computational capability and pattern recognition, but there is very little achieved in the area of business, including enterprise ecosystem relations and federated databases for sharing knowledge. As a result, the relationship between Grid Computing concepts and KM principles is still not clear. For instance, it is not obvious how Grid Computing can amalgamate collaborative machine semantics with human cognitive activities. The clarification of such a complex relationship may qualify this intergalactic network to minimize difficulties in transferring tacit knowledge across communities for creating authentic business values.

GRID COMPUTING

In historical progression, computer networks were designed to emulate social networks over time. The mainframe, then client/server, and presently the Grid Computing represent this developmental succession. Cabbly (2004) reports that “IBM defines Grid Computing as a standards based application/resource sharing architecture that makes it possible for heterogeneous systems and applications to share computing and storage resources transparently.” Unlike traditional client-server architecture, Grid Computing activates dormant microprocessing power to perform parallel processes and utilize massive storage facilities around the globe. However, constructing such a network as its predecessor client/server is not trouble free. De Roure, Baker, Jennings, and Shadbolt (2003) report that the traditional client-server model can be a performance bottleneck and a single point of failure, but is still prevalent because decentralization brings its own challenges.

To mitigate the risk of global operations catastrophes during climax computing demand periods, the grid offers better performance load balancing and fault tolerance through failover on a massive scale. The main benefits of Grid Computing for many companies will be the ability to integrate systems and dynamically allocate resources, management of risk, and improvement of their Return On Investment (ROI) through maximizing the performance/cost ratio. All these will result in solving problems in less time and with less cost and through using the same computing machinery, but with more power added.

SEMANTIC WEB

Berners-Lee, Hendler, and Lassila (2001) state that the Semantic Web is not a separate Web, but an extension of the current one, in which information is given well-defined meaning, better enabling comput-