Abstract

Grid computing technology is an emerging technology where computational and information resources are shared and managed by diverse organizations in widespread locations which are referred as virtual organizations. Grid computing offers valuable services to work groups such as auto and airplane designers, scientific researchers, drug-research firms. In Grid environments, resources are generally owned by different people, communities or organizations with varied administrative policies, and capabilities. The management of these resources i.e., discovery, monitoring and brokerage in such a large and distributed environment is a complex task due to geographical distribution and dynamic behavior of resources. Managing grid infrastructure plays a vital role in effectively utilizing the capabilities provided by grid computing technology.

The complexity of grid environment is growing due to increase in number of projects and applications that are being pursued in this domain. The demands exerted on grid resources by these applications are not only highly dynamic in nature but also varies substantially from application to application. For example, one application may need large number of CPUs and another application is memory intensive. This makes it difficult to identify idle resources, and the resource to application mapping. In such scenarios it is imperative that grids are managed by a well defined and scalable resource management system. Hence new paradigms and frameworks that deeply impact the possibility of discovering, monitoring and brokerage the resources need to be developed, with main focus on distributed management, efficiency, scalability, adaptability and reliability. As nodes and/or clusters appear and disappear quickly on the grid, automatic resource and service discovery should be performed. Continuous monitoring of the changes in grid behavior shall reflect the current state of resource availability. Brokerage need to be done based on the resource availability. To address these challenges, we have developed an architectural framework called Grid Management Information Server (GMIS).

The GMIS framework provides services for discovery, monitoring and brokerage of resources in a grid network. It includes distributed resource management architecture by employing remote monitoring of dispersed resources. The architecture distributes
resource management functionality across grid networks using GMIS-GMIS communication, where each GMIS manages a set of grids independently. A single user interface is provided to view resource information available at a single GMIS or all connected GMISs. Inadequacies of earlier approaches are clearly brought out with a comparative study and our contributions to this domain are presented.