for environments in which scale is bigger since the load is distributed to many locations. But even the load is hierarchically distributed; those methods may still suffer from bottleneck problem in large scale.

5. Conclusion and Future Works

In this paper, we have synthesized and analyzed some recent grid resource discovery methods which are based on centralized and hierarchical systems. We evaluated them by defining some qualitative criteria, and compared different classes of methods with each other. These types of resource discovery algorithms seem to have many disadvantages in large scale dynamic grid environments. But their simple design brings them to the foreground and makes them suitable techniques to be used in many grid management tools. Most web service based grid management tools use centralized and hierarchical grid resource discovery techniques. With regards to the examined methods, we can say that centralized and hierarchical systems based approaches are suitable for small scale grid environments in which the dynamicity of nodes is low. In such environments, they provide a very simple and standard resource management platform. There is vast amount of ongoing research in this topic which is aimed at solving problems mostly caused by scalability issues. P2P based [23-25] and Agent based [18-20] approaches in grid resource discovery are two of the most promising approaches in this field. A very comprehensive and detailed survey about those grid resource discovery approaches can be found in [6, 26-27].

We believe that combining advantages of different RD approaches would result in useful studies for resource discovery in grids. For example, by using web services, one can provide a simple interface to the users, while for the RD module, by using mobile agents or P2P techniques, a scalable, reliable and also easy to use resource discovery middleware can be designed. To the best of our knowledge, there is no research work which is directly focused on this subject. For this purpose, we are planning to propose a new cross-layer design approach in resource discovery which combines topology control, efficient multicasting and web services together. Firstly, we are planning to build virtual clusters in the grid environment which are represented by their clusterheads. Then we are planning to build an efficient topology, such as a spanning tree, between clusterheads in order to ease routing of the messages between peers. After building the topology, we are planning to deploy an efficient routing algorithm which uses all the advantages of the proposed topology. Finally we are planning to join web services in order to enable integration of our study to the current grid middleware systems.

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