

Service Oriented Distributed Manager for Grid System

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Abstract— Current problems in science and engineering become more complicated and need more computing power to tackle and analyze. The processing power of a single computer system has become inadequate for that problem and use of a supercomputer is not always an optimal solution. Nowadays institutions as universities or companies have lots of Desktop PCs in their infrastructures. With advanced in hardware, software and network grid computing are developed to benefits from these futures in idle computers in an efficient way to solve complex problems that need powerful computing requirements. Grid technology, which connects a number of personal computers, can achieve the same computing power as a supercomputer does, also with a lower cost. The goal of grid computing is to aggregate idle resources on the Internet or Intranet such as CPU cycles, storage spaces, etc. to facilitate utilization. In this research we present computational grid framework that used to utilize idle computers in Intranet to execute jobs in an efficient way than a single computer. We design and implement Service Oriented Distributed Grid Manager (SODGM) framework based on web services technology to manage resources and jobs in the system. SODGM balance the load among available resources to increase computers utilization in the system and minimize jobs response time. To evaluate the SODGM system, we performed tests on the Computers Laboratory in the Faculty of Computing and Information Technology in King Abdul Aziz University. The tests show that SODGM system provides good performance compared with using single computer in terms of execution time, resource utilization and system throughput.

Keywords- Grid; Web Services; management; job scheduling

I. INTRODUCTION

The growing popularity of the Internet and the availability of powerful computers and high-speed networks as low-cost commodity components are changing the way that we do computing and use computers today. The interest in coupling geographically distributed computational resources is also growing for solving large-scale problems, leading to what is popularly known as grid computing. In grid computing, a wide variety of computational resources, storage systems and databases, special class of scientific instruments (such as radio telescopes), computational kernels, and so on are logically coupled together and presented as a single integrated resource to the user¹.

Grid management system is more complicated. Grid development involves the efficient management of heterogeneous, geographically distributed, and dynamically available resources. In this environment, the resource scheduler become one of the most critical components of the Grid management middleware, since it has the responsibility of selecting resources and scheduling jobs in such a way that the user/application requirements are met, in terms of overall execution time (performance) and resources utilized. Resource management in computational Grids provides the ability to determine whether or not resources are available, and if so, map the submitted jobs to specific resources [1]. Therefore, a resource manager needs to be able to perform the following services in an efficient way: authentication services, information services discovery, deployment, monitoring, and scheduling services. Grid computing has adopted Web services technology to deal with environmental heterogeneity and to enhance service and application interoperability. However, it is a challenge to realize web service applications with high performance, reliability and availability to meet the requirements of grid communities [2].

In this research we study, design and implement prototype of manager framework that used to manage resources in computational grid based on service oriented technology. SODGM is a management and scheduling system which provides an easy way to manage distributed computational resources and an efficient way to process a large number of user requests for computing. It's designed depending on Web Service to adapt robust, scalable and interoperability requirements by the grid system.

The research is organized as follows: **section 1** introduces the research subject and it also addresses the objectives and motivation of the research. **Section 2** presents briefs background about the Grid system, its definition and characteristics. It also provides brief summary about web service technology and its core standards. **Section 3** presents the related work to this research and literature review of computation grid systems and management middleware. **Section 4** discusses the design of proposed grid manager middleware based on web services architecture and provides a model for service oriented distributed grid manager (SODGM). In addition, **Section 4** discusses the results that are