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Performance evaluation on a Grid platform

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Abstract

The technological advancements have resulted in substantial increase of commodity computing, mainly as the outcome of faster hardware and more sophisticated softwares. In spite the presence of super computers in present age, all the problems in the fields of science, engineering and business cannot be efficiently and effectively dealt with. This is mainly because of complexity factor and cost margin. For a complex program presented by any of the fields above, the data provided requires a number of heterogeneous resources that are scattered across the globe hence making the problem very cumbersome to handle. To address this; concept of grid computing evolved which combines and connects all the required heterogeneous resources to form a single entity which can resolve the problem at hand. With the implementation of grid at practical level lot of problems arise which need to be addressed before the system is put to use. One of the main aspects that must be kept under check while executing a problem set on grid is the security, which mainly includes the privacy and the integrity of the data that becomes vulnerable due to its distributed nature. This paper mainly focuses on the implementation of grid and gives the idea of the exponential difference between the performances of a stand-alone system in comparison to grid. In its broader view we intend to discuss analysis of a specific problem set on both the platforms, and provide the analysed data to support the high end performing nature of the grid in contrast to a stand-alone system.

Index Terms:-Grid computing, grid components, grid setup, performance evaluation.

1. INTRODUCTION

Grid Computing can be considered as an infrastructure service that makes computation available on demand like water, gas or electricity by joining resources spread over the globe at different locations. Grid is virtualization of resources which is a hardware software infrastructure that provides dependable, consistent, pervasive, and inexpensive access to computational capabilities, as described in Ian Foster and Carl Kesselman [1]. In grid computing sharing of computational resources (CPU cycles, disk space etc.) rather than data is be attained. Its key values are in the underlying distributed computing infrastructure technologies that evolve in support of cross-organizational application and resource sharing (virtualization) across platforms and organizations. This kind of virtualization is achievable through use of open standards, which ensure that applications can transparently take advantage of whatever appropriate resources made available to them. Grid computing could be defined as any of a variety of levels of virtualization along a continuum. Exactly where along that continuum one might say that a particular solution is an implementation of grid computing versus relatively simple implementation using virtual resources is a matter of opinion [2].

In most organizations there are lots of underutilized resources, such as computing and data resources. With the help of grid these unused resources can be properly utilized. Often, resources may have enormous unused disk capacity. Grid computing (more specifically, a data grid) can be used to aggregate the unused storage into a larger virtual data resource.

Grid also offers resource balancing by scheduling jobs on machine with low utilization.

On the basis of use, grid computing can be divided into different types:

- **Computational grids:** These type of grid are meant to provide secure access to computational resources, sufficient enough to perform processing of computational problems which otherwise would have required high computing power machines.
- **Collaboration grid:** With the advances in network hardware resources and Internet services, demand for better collaboration has increased. Such desired collaboration is best possible with these kinds of grids.
- **Utility Grid:** In this type of grid not only CPU cycles are shared, also other software's and special peripherals like sensors are also shared.
- **Network grid:** Even if we have computational machines with enough computational power as a part of grid but with poor network communication one can't utilize those machines optimally. Network grid provides high performance communication using data caching between nodes there by speed-up communication with each cache nodes acting as router.
- **Data grid:** There are two things, data and computation over that data. Data grid provides the support for data storage other data related services like data discovery, handling, publication, etc [3].