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# A Review for Recent and Current Trends: Improving Grid Reliability Service

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***ABSTRACT:-*** *Grid computing is an important and developing computing initiative that involves the collection of network connected computers to form a distributed system for coordinated problem solving and resource sharing. This paper presents a state-of-the-art review of grid computing.*

**Keywords:-** *Computing, Distributed System, Grid Computing, Resource Sharing, Review.*

## I. INTRODUCTION

Grid computing technology offers exciting solutions for parallel and distributed computing. It can provide reliable, collaborative, and secure access to remote computational resources, as well as distributed data and scientific instruments (I.Foster, 2002). The concept of grid describes a framework in which heterogeneous and distributed computational, networking, memory and storage resources can be linked to serve the needs of particular user applications (I.A. Khan, 2012). Grid computing has matured as it has moved from the realm of experimentation to mainstream technology. Today, there is much more to successful grid computing infrastructure than merely deploying fast or inexpensive servers (Rahul Kumar, 2012).

Grid computing is a newly developed technology for complex systems with large-scale resource sharing, wide-area communication, multi-institutional collaboration, etc (A. Kumar, 2000). It is a service for sharing computer power and data storage capacity over the Internet. (Yuan Shan, 2007)

Grid had its beginnings in the mid 1990's in scientific computing and was originally conceived and designed in this community to allow access to computing resources that were geographically dispersed. The aim was to even make use of underutilized resources in places other than where the researchers were physically located could be used.

In the early 1970s the idea of harnessing unused CPU cycles was born-ARPANET. In 1973, the Xerox Palo Alto Research Center (PARC) installed the first Ethernet network and the first full-fledged distributed computing effort was underway. Scientists John F. Shoch and Jon A. Hupp created a worm, as they called it, and envisioned it moving from machine to machine using idle resources for beneficial purposes. Later on Crandall installed software that allowed the machines, when not in use, to perform computations and to combine efforts with other machines on the network. In 1995 I-WAY was evolved as an experimental high-performance network linking many high-performance computers and advanced visualization environments. The internet brings new scale.

Distributed computing scaled to a global level with the maturation of the internet in 1990s.Distributed computing is defined as performing computations over autonomous computers distributed over the network. Since 1999 Grid enables a loosely-coupled, service-based IT environment .By pooling resources and applying very large amounts of compute power to their most strategically-vital tasks, grid computing lets organizations improve agility as they focus on their key priorities.

## II. LITERATURE REVIEW

A lot of work has appeared in the literature on the problems of the computational grid. A variety of problems have been discussed like estimating capacity, queue and resource management, scheduling. The summary of the articles published in the last 16 years is cited here.

### Studies Between Year 1997 And Year 2000 (03 Papers In Review)

### Towards A High Performance Extensible Grid Architecture

This paper proposed a grid architecture that is motivated by the large-scale routing principles in the Internet to provide an extensible, high-performance, scalable, and secure grid. Central to the proposed architecture is middleware called the grid operating system (GridOS). This paper describes the components of

the GridOS. The GridOS includes several novel ideas (i) a flexible naming scheme called "Gridspaces", (ii) a service mobility protocol, and (iii) a highly decentralized grid scheduling mechanism called the router-allocator.

**Distributed Computing Research Issues In Grid Computing**

This paper introduced distributed computing research issues in grid computing. Encapsulation of distributed, heterogeneous resources, or computational grids, has emerged as popular platforms for deploying large-scale and resource-intensive applications. They have focused on issues concerning the dissemination and retrieval of information and data on computational grid platforms.

**Matchmaking: Distributed Resource Management For High Throughput Computing**

This paper describes flexible matchmaking framework for resource management in distributed environment. It includes a semi structured data model in which entities advertise their services and requirements to matchmaker and matchmaker invokes an algorithm that notifies both user and server. Based on the claiming protocol user claims services from the server with the help of authorization key. It provides robustness and efficiency.

**Studies Between Year 2000 And Year 2005 (04 Papers In Review)**

**Distributed Data Mining On Grids: Services, Tools, And Applications**

This paper describes the framework of knowledge grid for implementing distributed knowledge discovery. It is composed of two hierarchic levels namely core k grid layer and the high level k grid layer. Both refers to services directly implemented on top of generic grid services and is used to design, compose, and execute distributed knowledge discovery computations over the grid. It helps in searching grid resources.

**A Taxonomy And Survey Of Grid Resource Management Systems For Distributed Computing**

This paper proposed an abstract model and taxonomy for describing resource management architecture. RMS manages the pool of resources available to the grid. Resource is a reusable entity that satisfies the job or resource request. It defines what is shared, who is allowed to share and the condition under which sharing occurs. It handles different jobs using different policies. It addresses the issues such as co-allocating of resources, supporting scalability, adaptability and economy of computations.

**Arms: An Agent Based Resource Management System For Grid Computing**

This paper describes about the homogeneous environment that provides scalable and adaptable system architecture. The agents are organized in hierarchical manner that provides service advertisement and discovery for the scheduling of applications for utilizing grid resource. It makes use of ACTs for recording the service information with other agents.

**A Computational Economy For Grid Computing And Its Implementation In The Nimrod-G Resource Broker**

This paper discusses about Nimrod g resource broker which manages all operations associated with remote execution including resource discovery, scheduling. It provides uniform access for diverse low level grid services and helps in management of job services for customized applications. The components of it are TFE-job control agent, scheduler- resource discovery, resource trading, resource selection, and job assignment and dispatcher- triggers appropriate actuators to deploy agents on grid resources and assign one of the resource mapped jobs for execution.

**Studies Between Year 2006 And Year 2010 (05 Papers In Review)**

**Risk-Resilient Heuristics And Genetic Algorithms For Security-Assured Grid Job Scheduling**

This paper models the risk and insecure conditions in Grid job scheduling. They proposed six risk-resilient scheduling algorithms to assure secure Grid job execution under different risky conditions. A Kiviat graph is proposed for demonstrating the quality of Grid computing services. Space Time Genetic Algorithm (STGA) is proposed for risk-resilient scheduling of many jobs continuously over a large number of Grid sites. These risk-resilient scheduling algorithms are experimentally proven in real-life implementations on grids.

**Performance And Reliability Of Tree-Structured Grid Services Considering Data Dependence And Failure Correlation**

This paper proposes a virtual tree-structured model of the grid service that simplifies the physical structure of a grid service, allows execution time to be efficiently evaluated considering data dependence and failure correlation. Based on the model, an algorithm for evaluating the grid service time distribution and the service reliability indices is suggested makes use of Graph theory and probability theory. It allows effective

distribution of computational tasks among different resources presented in the grid. Yet Data dependence and failure correlations have great influence on service reliability and performance that cannot be ignored.

**Overhead Analysis Of Scientific Workflows In Grid Environments**

This paper proposed a new systematic approach to help the scientists and developers to understand the occurrences of performance losses during the execution of scientific workflows in dynamic Grid environments. An ideal model is introduced for the lowest execution time that can be achieved by a workflow. Workflow activities are typically legacy codes that can be remotely accessed and instantiated using a Grid Resource Allocation Manager. It is assumed that the work performed by the workflow computational activities is a useful execution time. This method is illustrated through postmortem and online performance analysis of two real-world workflow applications executed in the Austrian Grid environment.

**Grid Virtualization Engine: Design, Implementation And Evaluation**

This paper focuses on building a Web service based virtual machine provider for Grid infrastructures. The Grid Virtualization Engine creates an abstract layer between users and underlying virtualization technologies and implements a scalable distributed architecture in a hierarchical flavor. Based on the experiments and tests it is proved that GVE is an efficient and lightweight middleware for building grid infrastructures with virtual machines. The GVE Agent Service can be plugged in the system at runtime and serve for multiple GVE Site Services simultaneously. It provides scalability, availability and interoperability to the system.

**Multi-Polar Autonomous System Grid Resource Scheduling Model And Algorithm Based On Multi-Agent And Ga**

In this paper, grid resource scheduling was studied and according to it some innovation and improvement were made. They are 1) distributed and centralized management were combined. 2) A Work mode from low to high level was presented. 3) An agent based system design. 4) Task distribution and scheduling algorithm was improved. 5) Genetic algorithm was used to optimize globally task assignments. This model with dynamic self adaptive and unlimited features helps to meet the new requirements of grid technology development.

**Studies Between Year 2011 And Year 2013 (04 Papers In Review)**

**Grid Service Reliability Modeling And Optimal Task Scheduling Considering Fault Recovery**

This paper introduces Local Node Fault Recovery (LNFR) mechanism into grid systems and presents a study on grid service reliability modeling and analysis with this kind of fault recovery. Based on this model multi objective task scheduling and ant colony algorithm was presented. An influence of fault recovery on grid service reliability with the help of ACO solves the grid task scheduling problem. LNFR provides an opportunity to resume execution from failure. It is assumed that failures occurring on both nodes and links satisfy Poisson processes that are not true in all cases.

**Dynamic Provisioning Of Self-Organized Consumer Grid Services Over Integrated Obs/Wson Networks**

This paper proposed an optical burst switching (OBS)/wavelength switched optical network (WSON) infrastructure to support the consumer Grid services. It overcomes the limitations of resource discovery and management, network infrastructures which helps in self organized resource discovery and management. The experiments prove that TCP is the suitable protocol for grid. For the successful execution of grid job resources must meet the job requirements in a transparent manner. In order to overcome the issues like server updating, fault tolerant recovery a P2P based scheme is introduced which manages the resources in a distributed way for job requests execution. SRDM scheme is developed based on the P2P-based scheme by taking into account the blocking probability and end-to-end latency. Thus it provides high resource utilization, fault tolerant and high speed data transmission.

**Performance-Driven Load Balancing With A Primary-Backup Approach For Computational Grids With Low Communication Cost And Replication Cost**

This paper proposed a PD_MinRC algorithm that considers fault tolerance with minimum replication cost, dynamic load balancing and grid scheduling with moderate communication cost. Network congestion is prevented as message exchanges between the resources are simple and small sized. It provides good performance results and better resource utilization even during resource failures. It is a flexible approach in dealing with the changes that happen in the grid. Yet issues related to security have not been considered.

**Reliable Collective Communications With Weighted Srlgs In Optical Networks**

This paper solves the problem of reliable collective communication with the aim of maximizing the reliability of the collective communication. A greedy approximation algorithm is used to construct collective communication through a spanning tree that achieves an approximation ration. The idea behind the algorithm is to choose an SRLG and remove it from the edges. It considers differentiated reliability when making routing decisions. Thus the reliable communication is NP-hard for minimizing the total number of SRLGs among the trees. Yet it does not provide sufficient reliability. Only greedy approximation algorithm can be used. No other algorithms are used to maintain and calculate reliable communication.

## III. CONCLUSION

Grid computing appears to be promising for effective use of computer resources. It suggests that the resources of many computers which are not in use can be utilized for other computational task. Thus the review of many grid computing papers is useful for many upcoming engineers for their researches.

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