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EVALUATION OF COOPERATION STRATEGIES IN P2P COMPUTING SYSTEM

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Abstract

A new technique called grid computing pools resources from several places to handle complicated problems. Peer-to-peer (P2P) computing is a type of computing where several computers are linked together over the internet and their resources are used to tackle challenging issues or jobs. To resolve complex parallel applications, it utilizes the idle cycles of all the computers linked to the network. The main obstacle that the peer-to-peer network must overcome to efficiently use the resources and allocate jobs to them is an effective cooperation strategy. Users in P2P networks frequently use resources without making a profit in return, therefore cooperation is crucial. Several collaborative strategies have been compared in this work to demonstrate their effectiveness in enhancing inefficient resource use and scalability.

Keywords: *Grid computing; P2P computing; collaborative preparation; resource utilization*

I. INTRODUCTION

Geographically dispersed heterogeneous resources make up grid computing. Resources may enter and exit the grid system at any moment due to its dynamic nature. The dynamic nature of the Grid makes it challenging for the system to plan resources, which leads to ineffective resource management and usage. Allocating tasks to the resources that are available in the process of preparation. Numerous methods have been devised to do effective resource preparation, yet it is still difficult to accomplish proper resource use. When resources are assigned to tasks, resources with high-performance levels could also be given those tasks, overloading the resource and limiting its effective use in the system.

Systems for peer-to-peer computing make use of the CPU idle cycles of computers linked over the Internet. They run extensive parallel distributed applications using the resources. To distribute jobs to diverse computer resources, such systems need an effective preparation apparatus. The centralized preparation techniques, however, appear to be ineffective since decentralized settings' preparation processes demand lengthy processing times. This is due to the possibility that they might create a clog and a single point of failure.

To encourage collaboration and resource sharing among peers and boost system performance, incentive strategies must be developed. Because users in P2P networks consume the greatest amount of resources while contributing the least amount, cooperation is valued. For effectively distributing parallel applications in P2P computing systems, a two-level preparation method is utilized.

The structure of this essay is as follows. The important ideas in this study are discussed in Section II. We offer the comparison research in section III. We describe the collaborative preparation technique in Section IV. We compare several preparation strategies in Section V. In Section VI, we wrap up.

II. Main Ideas

A. Grid computing

To complete huge tasks, numerous resources that are widely spread are combined in a process known as "grid computing." It offers techniques that make a variety of diverse resources easier to utilize and access. The resources and duties in a grid system vary quickly, which is why it is called dynamic. The grid is heterogeneous because different types of widely dispersed resources and activities are combined from many sources to accomplish a single objective. The grid system gives users access to large-scale capabilities, thus it has to be able to gather a lot of resources and tasks and give them a safe method to access them.

B. Peer-to-Peer computing

Peer-to-peer (P2P) computing is a distributed paradigm that is frequently used to create applications, from large-scale scientific programs to quick information exchanges, by pooling resources from different sources to complete tasks. However, the problem of resource sharing in the grid environment is brought on by the varied and dynamic character of the peers across many domains.

Resource management in these settings is complicated, though. These systems require efficient procedures for fair resource sharing, adapting to changing dynamic environments, guarding against various internet assaults from cooperating peers, and coordinating a variety of rules, cost models, and peer loads.

C. Collaborative preparation

In collaborative preparation, processors pool their knowledge to decide how to allocate resources. For people to choose how to use their resources and how to make choices involving them, this specifies how autonomous the process is. Each processor completes its scheduled duty in a collaborative setting, yet they all cooperate to increase efficiency. In contrast, the processors in the noncollaborative system behave as autonomous entities and independently manage their resources.

D. Resource utilization

Utilizing resources effectively achieves load balance. Any number of operations might unforeseen need greater processing power in a distributed system. Once the algorithm has been properly applied, the resources may be priced and transferred more effectively to the processors with lighter loads.

III. Comparative Study

This section provides research on several collaborative preparation techniques for enhancing the performance of peer-to-peer systems and their capacity to scale. The processes presumptively allocate 10,000 employees across 50 managers in a random manner. Additionally, it is believed that each region may disseminate no more than 400 peers. Peers are expected to be single-taskers as well.

A. Collaborative and decentralized workflow preparation in global grids

To address the lack of a collaborative apparatus that might result in ineffective preparation across distributed resources and ineffective resource utilization, collaborative and decentralized workflow preparation in dynamic and distributed grid systems [4] was established.

The technique makes use of a d-dimensional logical index space based on distributed hash tables. The system's participants collaborate. It offers a technique for controlling coordination objects and decentralizing the system using a DHT-based geographical index. To map the tasks to the resources via the coordination space, it offers a decentralized resource provisioning apparatus. The apparatus's application will lead to the elimination of performance bottlenecks as well as effective preparation and increased scalability.

B. Coordinated load management in peer-to-peer systems

Resource allocation and decentralized coordination are achieved through the development of coordinated load management in peer-to-peer grid systems [5]. The overall administration of the applications in distributed Grid computing systems is under the control of resource brokering services.

For effective administration of the coordination objects, the coordinated load management technique makes use of a distributed hash table. To be more precise, a DHT overlay is used to arrange the resource brokers and resources in this approach. In this method, resource brokers use a Resource Claim object to publish their resource requirements into the coordination space, while resource providers use a Resource Ticket object to notify their resources. Utilizing a hashing method, these items are mapped to coordination services.

C. Cash-based apparatus

The degree of system collaboration affects how well peer-to-peer systems function. Peer-to-peer systems in use are not collaborative. Different solutions to the issue that had been created before are difficult to implement or do not offer compelling incentives for collaboration. The cash-based approach [3] is predicated on the notion that by accepting uploads, income is provided to the node, and that downloading is compensated.

Tokens are used by the users to trade data within the system. Users should get rewards for providing uploads, being online in the systems, and paying for downloading content. Only users with enough tokens to download the entire file may initiate a download. The systems based on currency are overly complex.

D. An Exchange-based incentive apparatuss

Peer-to-peer resource-sharing networks operate best when users work together. The exchange-based incentive apparatus [2] offers motivation for peer-to-peer system collaboration. In addition to offering customers more service time as compared to free riders, the concept offers substantial incentives for file sharing without the complexities of cash-based and credit-based systems.

The fundamental tenet is that peers prioritize those peers who can offer a service in return. The apparatus is appropriate for heavily loaded or overloaded systems. Users are strongly encouraged to exchange resources thanks to this.

E. Incentive apparatus for preparation jobs in a peer-to-peer computing system.

The two-level topology credit-based incentive and preparation system [1] was designed. The non-negative credit function is implemented at a low level. Credit reinvestment fosters greater peer collaboration. To increase scalability, the upper level is added, and preparation is accomplished regardless of the number of peers with better scalability.

If the duplicated and multi-task execution on each peer is taken into account, the global incentives apparatus can be enhanced. The method reduces system-free riders and increases system throughput.

F. The social network algorithm to improve peer cooperation

The peer-to-peer credit transfer feature evolved into the social network algorithm [6]. The system is designed to reward good behavior among peers and penalize bad behavior.

It appears that peer-to-peer credit transfers are less secure. The secure transfer is impacted since the history of credit transfers between peers is not kept up to date. By taking away the credits and transferring them to more collaborative peers, the credit transfer apparatus aids in the prevention of disruptive peers. The social network algorithm offers a technique that enhances peer collaboration, boosts the delivery ratio, and also boosts the success ratio.

IV. Collaborative Preparation Apparatus

In peer-to-peer computing systems, a collaborative preparation technique [7] with a two-level architecture was created for distributed and parallel applications. Each manager in charge of a certain region handles the low-level preparation. The scheduler is thought to be familiar with the necessary details regarding the resources. The low-level scheduler performs near-optimal task mapping using a preparation policy. High-level preparation is used as a result of the scalability problems. More schedule details are needed at the higher level. Preparation criteria are used to distribute tasks throughout the regions, reducing the amount of information needed at this level of preparation.

Task distribution across regions is handled by the distributed scheduler. The distribution of jobs is effective and balanced. The apparatus's use lowers and manages the cost of preparation. The dispersed, massive, and diverse contexts in which the collaborative preparation method is intended to operate.

V.Comparison

The comparison of various collaborative preparation apparatuss is done using different parameters and is shown in Table 1.

Table 1. Parametric comparison of collaborative preparation apparatuss

Parameters/Papers	Distributed Hash Table based spatial index	Cash-based apparatus	Exchange-ased Incentive apparatuss	Incentive apparatus	social network algorithm
Dynamicity	Less	More	More	More	More
Collaborative	Medium	Medium	Yes	Yes	Yes
Resource Utilization	More	Less	Less	More	Less
Scope	Local	Local	Global	Global	Global
Process Migration	No	No	No	Yes	No
Stability	Small	Large	Small	Large	Small
Scalability	Medium	Low	Low	High	Low

VI. Conclusion

There have been studies and classifications of the many collaborative preparation techniques. Both their advantages and disadvantages have been highlighted. This study's objective is to compare various systems and offer insight into their individual properties. The study will support the creation of more capable preparation processes. Future research might focus on improving apparatuss' shortcomings to make them more effective in a dynamic setting.

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