GRID-BASED UTILITY COMPUTING: OPTIMIZING SERVICE RELIABILITIES AND INCREASING SERVICE CAPACITIES

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ABSTRACT

This work investigates a non-polynomial (NP)-hard combinatorial optimization problem related to growing service capacity and boosting service dependability in grid-based utility computing. With theoretical justification, the problem is deconstructed into master and slave sub problems, and a computationally efficient two-level iterative approach for solving it is proposed. An ordinal optimization-based n-stage technique is used to solve the slave sub problem, together with an approximate model for objective value evaluation. A bisection method is employed to solve the master sub problem. The solution achieved using the suggested iterative two-level technique is optimal under certain conditions.

I. INTRODUCTION

Scientists can use GRID computing to address highly difficult issues, especially those that need the sharing of widely distant data and computer resources. Grid computing installations have recently expanded beyond the "big science" of specialised research programmes like Search for Extra-terrestrial Intelligence to regional and even individual corporate levels. As a result, computing services have evolved into a utility that is delivered across a grid similar to the energy grid and paid for by its consumers. Grid-based computing services are provided by the service provider, which are both dependable and cost-effective.

In addition to grid resource management, utility computing service providers may be required to extend their service capacity based on the current grid in order to meet the fast increasing demand for diverse computing services. This paper aims to spend the least amount of money possible on purchasing additional computing resources, such as hardware, software, and databases, and installing them at appropriate nodes in the current grid to maintain current service reliability and support the reliable delivery of additional services. This problem is more difficult to answer than a conventional NP-hard combinatorial optimization problem since it is similar to resource allocation.

In reality, there are a variety of resource allocation issues related with grid computing systems. Sweeney and Ahuja, for example, explore finding the best mix of resources in a grid to service specific computing needs with the least amount of processing time and cost. The one described by Dai and Wang is a grid resource allocation planning challenge. Their challenge is to determine the appropriate collection of resources to buy and the nodes at which they should be put in order to maximise service dependability while staying within a budget. The optimization issue covered in this study is strictly speaking an extension of a previously defined problem.

II. RELATED WORKS

Grid computing is a concept that refers to the use of numerous administrative domains' computer resources to achieve a shared aim. The Grid is a distributed system that handles non-interactive tasks with a high number of files. Grid computing differs from traditional high-performance computing systems like cluster computing in that grids are loosely connected, diverse, and geographically scattered.

Although a grid might be dedicated to a particular application, it is more typical for a single grid to be utilised for several purposes. Grids are frequently built with the help of middleware, which are general-purpose grid software libraries.

The size of the grid might vary significantly. Grids are a type of distributed computing in which a "super virtual computer" is made up of several loosely linked computers that work together to complete massive tasks. Furthermore, "distributed" or "grid" computing is a sort of parallel computing that uses whole computers (with onboard CPUs, storage, power supply, network interfaces, and so on) connected to a network (private, public, or the Internet) through a standard network interface, such as Ethernet. This is in contrast to the usual concept of a supercomputer, which consists of several processors connected by a high-speed computer bus on a local level.

III. PROPOSED SYSTEM

Scope of the work

Increasing service capacity and dependability in grid-based utility computing, hence resolving the challenge of resource allocation in big grids.

Existing system

These are all NP-hard combinatorial optimization issues that are similar to resource allocation. To identify solutions, heuristic techniques like the genetic algorithm (GA) and the simulated annealing (SA) approach are utilised. When the grid is big, calculating the precise dependability of each sort of service takes a long time. A heuristic approach for calculating estimated dependability may be found here.

Limitations

Because the investigated optimization issue aims to keep the precise dependability of all types of services above a specific level, which is represented as inequality constraints on the exact service reliability, the simulated annealing (SA) approach cannot be used. As a result, a genetic algorithm (GA) or a stochastic algorithm (SA) by itself may not be able to produce a reasonably excellent solution in a reasonable amount of time.

Proposed system

To overcome the problems that occur due to computational complexity. The investigated Optimization issue is split into iterative master and slave sub problems based on the service reliability inequality constraint. The slave sub problem is then solved using an ordinal optimization (OO) Approach connected with an approximation model, while the master sub problem is solved using a bisection approach. They also expanded their research to include tree-structured grid services in terms of both reliability and performance. The computer grid discussed in this study, on the other hand, has a generic structure.

Advantages

The proposed system would determine the appropriate set of resources to acquire and the nodes where they should be put in order to maximise service dependability while staying within a budget. The proposed system aims to spend as little money as possible on extra computer resources, such as hardware, software, and databases.

IV. RESULT AND DISCUSSION

Sample output screenshots:

Figure 1: Grid server

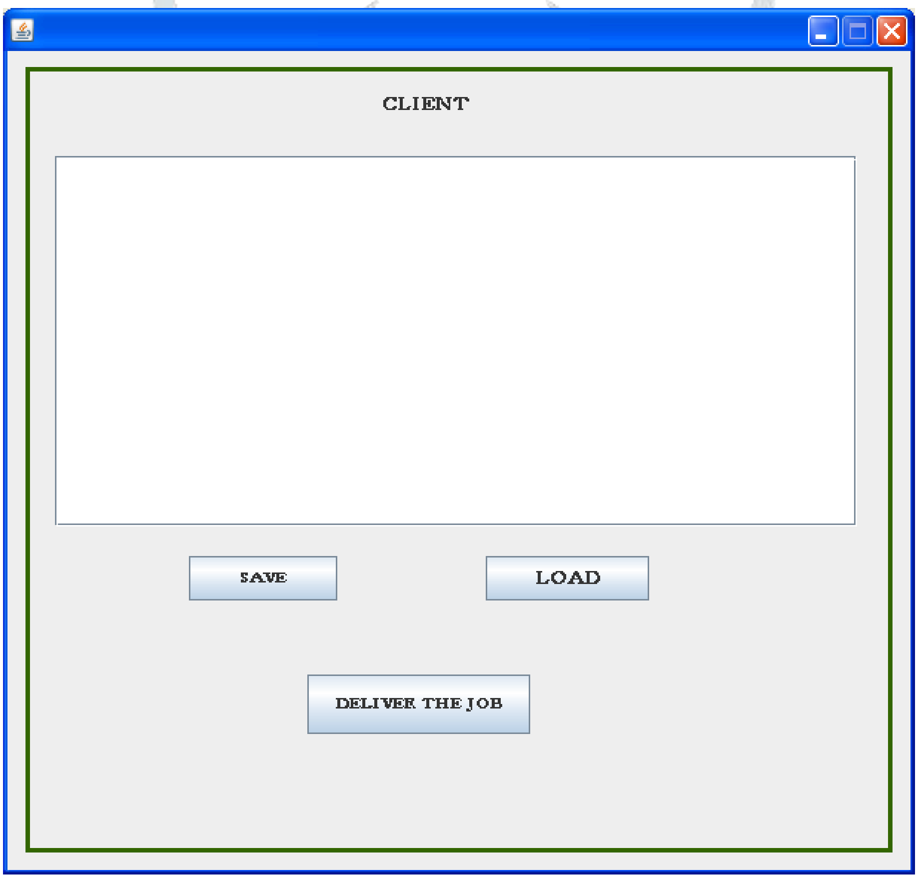

Figure 2: External client page

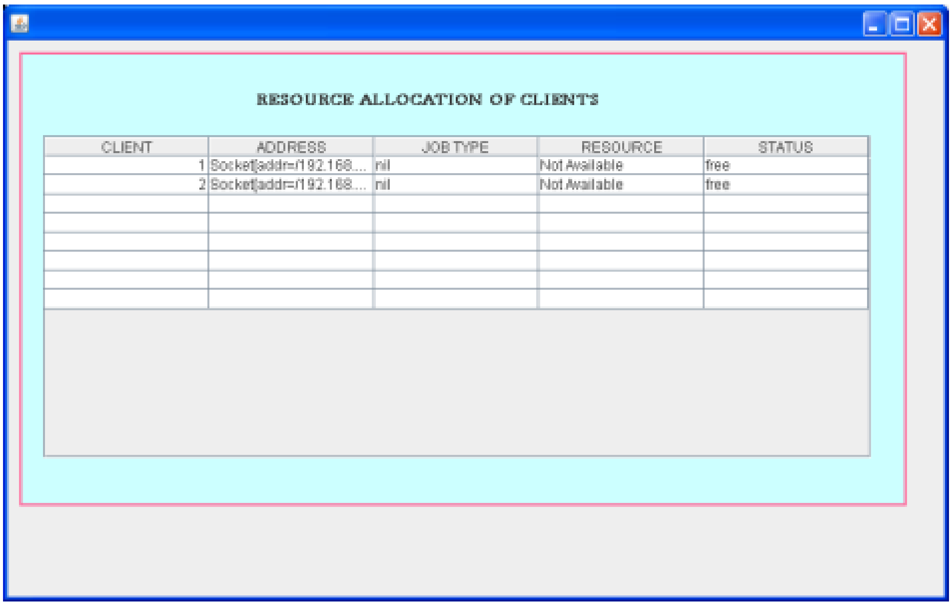

Figure 3: Resource allocation of clients

V. CONCLUSION

For the first time, an iterative two-level strategy is proposed in this study, which uses an approximate model to calculate service dependability and the OO-based n-stage method to solve a slave sub problem. Furthermore, certain adequate requirements are derived, and if they are met, the solution found using the iterative two-level approach is optimal for (1). One of the most significant contributions of this study is the reduction of the computing time necessary to achieve an optimal solution to the problem of interest (1), which is an NP-hard combinatorial optimization problem. Furthermore, the proposed OO-based n-stage method with the approximate model can be used to solve a variety of service and dependability issues.

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