Research on Optimal Scheduling of Cloud Computing Resources based on Virtualization Technology

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Abstract: In order to solve the defects brought by the network virtual technology, proposes a virtual computing resources optimization algorithm based on cloud technology. Through virtual machine scheduling optimization technology based on shared resources, use the platform for system integration, optimization, and the algorithm validation test, test results show that compared with the traditional calculation and resources the scheduling system, more effective use of its resources, higher accuracy, and has more practical value.

Keywords: virtual ttechnology; cloud computing; resource utilization, system services

1. Introduction

Introduction of virtualization technology has brought the following benefits: the more fine-grained resource sharing, security isolation and high reliability [1-3]. Through the sharing multiplexing technology with the virtual machine as the granularity, the virtualization platform can effectively make the servers consolidation to improve resource utilization, and ultimately improve the overall resource utilization of cloud computing infrastructure. But now the virtualization technology focuses on resource optimization within a single physical server, and through resources multiplexing technology the resource utilization of a single server is improved.

The rise of cloud computing is gradually changing the entire computer industry and academia, the way which uses computer as the utility tool and software as a service brings great changes to the computer software and hardware design [4-6]. Cloud computing is an information service mode, which can distribute user tasks to a resources pool form by a large number of physical or virtual organizations, allows users to access of required information service, cloud computing resource scheduling mainly includes five features, as Figure 1.

Since the existing traditional cloud resources data center does not have a global two-way choice transaction, has not fully considered the multidimensional cloud resource's scheduling and communication energy between cloud tasks. Therefore, cloud resource providers of the existing cloud data center has low income, multidimensional cloud resource utilization is low and the cloud data center energy consumption is high. Cloud users are service users at the mean time they can gain income by providing resources [2-6]. An increasing number of available cloud resources added to the cloud data center, thus alternative cloud service resources is increasing. Cloud service users can obtain more cost-effective service, and cloud resource providers can also obtain greater benefits. Buyers need to pay fees for using the service. In the continuous developing process of cloud computing applications, the user scale of the managing resources and access in cloud resources platform will further expand. The access of vast resources information, users' resource request with high concurrency and vast resource update bring huge challenges for resource management systems, which makes the resource efficient management and allocation become one of the key issues that must be addressed .

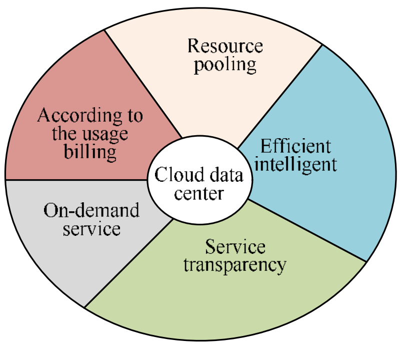

Figure.1. Feature of Cloud Computing Resource Scheduling.

2. System Features

N variables constitute the decision problem with n-level; the j_{th} level(the j_{th} variables) has l_j nodes; at the beginning m ants are on the first level; the j_{th} level select the probability of the i_{th} node.

$$diff\left(c_i, c_j\right) = \frac{cv_i . cv_j}{|cv_i| . |cv_j|} \quad (1)$$

t_{ij} is the intensity of attracting of the cv_i node on the j-level. Update equation is as follows:

$$m_{ij}^{(1)} = [\int_s f_i f_j dA] I_3, m_{ij}^{(2)} = \int_s j_i j_j dA;$$

$$l_{ij}^{(1)} = \begin{cases} 2\int_s [f_i \varnothing j_j - n(\nabla s j_j)^T \nabla s j_j] dA, \text{ for SDF} \\ \int_s [f_i [\varnothing j_j + 2n(H^2 - K) j_j] - n(\nabla s f_i)^T \nabla s j_j] dA, \text{ for WF} \end{cases} \quad (2)$$

$$l_{ij}^{(2)} = -\frac{1}{2}\int_s [j_i (\varnothing f_j)^T - (\nabla s j_i)^T \nabla s f_j n^T] dA$$

Wherein: ρ represents the attenuation coefficient of intensity; generally 0 67 ~ 0.89; Q is the positive number; f is the value of objective function.

Because the virtual resource has the characteristics like heterogeneous, distribution and dynamic in cloud environment, it is important to conduct a relatively comprehensive distributed scheduling algorithm simulation environment. Open source cloud computing simulation platform Cloudsimdevelop the function library in the discrete event simulation package Simjava, whichinherites the programming model of Gridsimand supports the research and development of cloud computing.Cloudsimis advantage for accelerating thealgorithm and method of the cloud computing and development of norms, which is an ideal simulation platform. Virtual resource collection: Suppose there are k virtual resources in cloud environment, and the virtual resources isdefined as follows:

$$W(S) := \int_S R^2 ds \quad (3)$$

Expected execution saves the completion time matrix: the required time of resources ds executing task R^2 under the no load conditions, denoted as ETC_{ij}. All value of ETC_{ij} elementsmake up the ETC matrix.

ETC matrix corresponding to c_1 tasks and g_1 virtual resource aregiven as follows:

$$(c_1, g_1, r_1) \bullet (c_2, g_2, r_2) = (c_1 \oplus c_2, g_1 \textbf{ e } s^{r_1}(g_2), r_1 + r_2) \quad (4)$$

3. Algorithm's Optimization

In the existing resource optimization in cloud computing, cloud resources users' needs is always greater than cloud resources' actual demand. In the past,there were kinds of algorithms' cloud resource scheduling model in the traditional cloud computing resource scheduling, but most algorithms are unable to play its full role more of virtual resource space, on the effect of optimized iterative method for solution, traditional general methods will at a certain extentdepend on the batch rules used by the algorithm, resulting in a bottleneck to optimizing algorithm's performance. Thus this paper presents cloud resource scheduling model of combining both genetic and ant colony algorithm, which can effectively overcome this shortcoming. There are both advantages and shortcomings of this algorithm, both are global optimization algorithm which are unsure on probability. It starts from the initial population, utilizing factor's crossover and mutation to make the population can quickly get the optimal solution of iterative function. In the optimization process, it does not depend on the objective function of the problem itself, without any restrictions of end conditions, and seeks its own optimal solution under uncertain limited conditions. Its status before and after optimal solution are schematically shown in Figure 2.

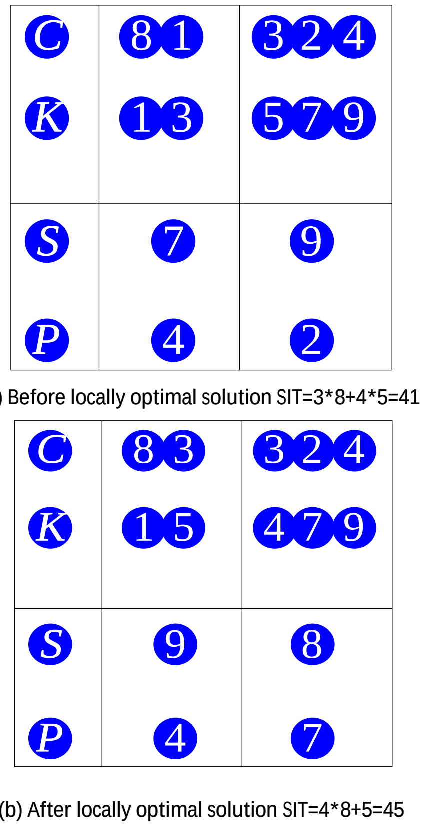

Figure. 2. Schematic Diagram of Iterative Optimization Algorithm for Solution.

4. Conclusion

Cloud resource scheduling computing is a hot research topic at home and abroad, it plays an important role in promoting the development of information. Hawei Tang, Wei Lin, etc., proposed pricing mechanism based on the consumption of resources thinking, which can put cloud resource providers and users together, allowing users to run computing tasks in the public cloud [1-2]. Wu Pinyun and others proposed a secondary positioning pricing mechanism based on dynamic auction mechanism to solve the problem of resource allocation [3-4]. An important element of the cloud service secondary pricing mechanism is that cloud service providers can ensure a reasonable return and efficient computing resource allocation [5-6]. Service providers have two tasks: first, run-time monitoring and allocation of resources to the cloud user.

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