

Decision Making System to Automate The Cloud Service Selection Using PSO Algorithm

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Abstract- Recently, a growing development and employ of Cloud computing services has been observed. Especially modeling multi-organizational cooperation and the individual provider comparison are gaining importance. Despite preliminary positive results, it is challenging in theory and practice to find an appropriate provider matching the individual requirements. Moreover, the comparison process is difficult by a number of new entrants as well as offers of non-transparent services, which sometimes differ significantly. To overcome these challenges, we propose an approach which can be used in the evaluation based decision-making process based on a set of computable factors in the pricing models of cloud providers. In the presented approach, pairing among different components of the system is measured. Then, a proposed cost measuring function is used to prefer the optimal migration scenarios. And implement Particle swarm optimization to find the best values from particle for select optimal cloud service system to overcome complexities in web application systems.

Keywords- Quality of service, Decision support system, Cloud fitness, Service selection, Migration

I. INTRODUCTION

Recently, service-oriented computing, in particular cloud computing technology has been developed rapidly. Cloud computing model can combine various services to form new value-added services in order to satisfy end users' requirements. With the growing number of available services in the cloud environment, users have put forward new demands to solve the service selection problem quickly and efficiently. However, the aim of current researches in cloud-based service selection is to maximize the overall object only for single service process, and the researches ignore the service association in service selection problem. Furthermore, the execution efficiency of service selection methods needs to be improved further. In this paper, we introduce an evaluation model of service process which evaluates the service process from three dimensions which are functional quality dimension, non-functional quality dimension and transactional dimension. The comprehensive evaluation model also considers concurrent requests and service association problem. In this paper, the problem of service association is divided into two

levels: the granularity problem in abstract process level; the service dependency problem in concrete process level. To solve the service selection problem efficiently, we first design a novel coding strategy, and then propose an approach based on hybrid particle swarm optimization algorithm which combines the crossover and mutation operators of genetic algorithm. The experimental results show that our proposed approach is feasible and effective.

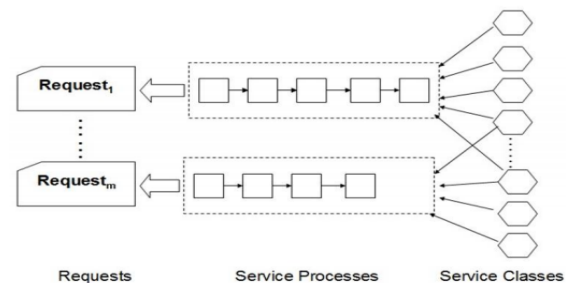


Fig 1: Service selection problem

II. RELATED WORK

M. Menzel, et.al..., [7] introduce the Cloud Genius framework that lowers hurdle introduced by the difficulty of the Cloud migration process. Cloud Genius offers a full process and broad decision support that reduce engineer's effort of finding a proper infrastructure service and VM image when migrating a Web application to the Cloud.

R. Hamadi, et.al..., [9] propose a Petri net-based algebra for modeling service control flows. The model is expressive enough to capture the semantics of complex service combinations and their respective specificities. The obtained framework enables declarative work of Web services and show that the defined algebra caters for the creation of dynamic and transient relationships among services.

T. Binz, et.al..., [5] allows service creators to gather into plans those activities necessary to organize, direct, and terminate the described cloud service. Due to the portability of tactics and the operations they use, TOSCA services can be operated in different management environments.

S. Wang, et.al [3] propose a new concept, called QoS uncertainty computing, to model the inherently undecided of

Web service QoS and adopt cloud model to compute the uncertainty of QoS. According to the three numerical characteristics of cloud model, the web services with a large variance on their QoS can be pruned. To the best of knowledge, this is the first work that computes the uncertainty of QoS for web service selection

R. Buyya, et al., [2] examine architectural elements of Inter Cloud for utility-oriented federation of Cloud computing environments. The proposed Inter Cloud environment chains scaling of applications across multiple vendor clouds. The different components of the proposed framework to address both services and resources management, but their back-to-back combination aims to dramatically improve the effectual usage, management, and administration of Cloud systems. This will provide better degrees of scalability, flexibility, and simplicity for management and delivery of services in group of clouds.

III. CLOUD GENIUS: GENETIC BASED DECISION SUPPORT SYSTEM

By leveraging Cloud services to host web services can profit from advantages such as elasticity, pay-per-use, and profusion of resources. However, users tend to avoid or setback migrations of service consumption to the Cloud due to several hurdles. With Cloud computing being a unruly technology an implementation carries along risks and obstacles. The proposed system handles difficulty is the complexity of migrating services to the Cloud on a technological level while incorporating economical aspects. A migration from an organization-owned data center to a Cloud infrastructure service imply additional than few insignificant steps. The following steps outline a migration of an organization's Web application to an equivalent on a Cloud infrastructure service. Steps of a migration to a Platform-as-a-Service (PaaS) would differ in numerous regards. There are two major approaches for migration to the cloud. The first approach is to progress the whole application to the cloud. On the other hand, adopt hybrid migration. The former approach is likely to provide privileged response times. In hybrid migration, some parts of the application are stimulated to the cloud, while other parts are kept on basis based on migrated process. This hybrid approach done using Genetic algorithm and Analytical Hierarchy Process (AHP). The algorithm concepts as follows:

GENETIC ALGORITHM:

In a genetic algorithm have large number of population, which instruct candidate services (called individuals, creatures, or phenotypes) for overcoming

optimization problem, evolves in the direction of better services. In each generation, the fitness of each individual in the population is estimated, multiple folks are stochastically selected from the present population (based on their fitness), and adapted (recombined and possibly randomly mutated) to structure a new population. The new population is then worn in the next iteration of the algorithm. Commonly, the algorithm stops when either a greatest number of services have been produced, or a acceptable fitness level has been attained for the population. If the algorithm has finished due to a maximum number of iteration, a satisfactory resolution may or may not have been reached. It is used to select the cloud services from IAAS layer.

ANALYTICAL PROCESS (AHP):

The AHP is based on a couple wise comparisons, with the attributes equipped into a hierarchal connection, which is very helpful. The pecking order starts from the top point towards the goal; the lesser levels communicate to criterion, sub-criteria, and so on. In this hierarchy tree, the procedure starts from leaf nodes and progress up to the peak level. Each output level signifies the hierarchy corresponding to the weight or influence of different kindling originating for that level. Finally, past making the comparisons, the best choice with respect to each quality is usually selected.

IV. CLOUD GENIUS: PSO BASED DECISION SUPPORT SYSTEM

With the rising number of alternative services in the cloud environment, users have put ahead new requirements to solve the service dynamic access problem quickly and efficiently. In this paper, an evaluation model of service procedure which considers simultaneous requests and service relationship is proposed. This model assesses the service process from dimensions which are service configuration and user feedbacks. To solve the service selection problem efficiently, we first design a novel solution of particle, and then propose an approach based on hybrid particle swarm optimization algorithm which combines various services. The pseudo code of the algorithm as follows:

For each particle

Initialize particle

END

Do

For each particle

Calculate fitness value

If the fitness value is better than the best fitness value

(pBest) in history

set current value as the new *pBest*

End

Choose the particle with the best fitness value of all the particles as the *gBest*

For each particle

Calculate particle velocity according equation (a)

Update particle position according equation (b)

End

While maximum iterations or minimum error criteria is not attained

The basic model of PSO algorithm aims at the continuous numerical solution. From the encoding method of the candidate, it can be known that service composition optimization problem in this paper is a discrete problem. The velocity and shift models require to be improved to ensure the particles to fly inside the integer space. The proposed framework select the services based on PSO and framework as shown in fig 2.

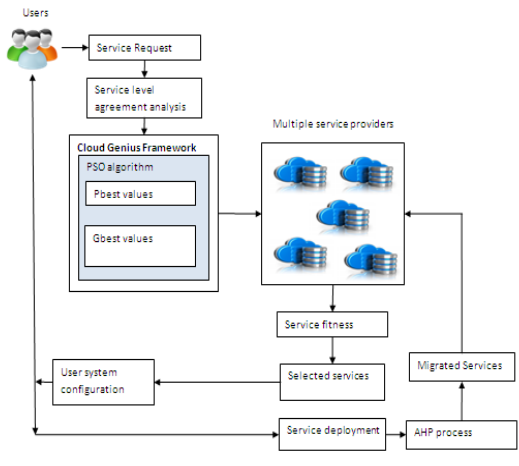


Fig 2: Proposed framework

V. EXPERIMENTAL ANALYSIS

The Experimental system is used in a medium-sized service system to manage and integrate work throughout all phases. It is a web application that is implemented using PHP with MySQL. And evaluate the performance based computation time metrics. This metrics is plotted for both existing and proposed system and visualized in graph format in fig 3. The proposed hybrid decision making system provide reduce computation time at measured using milliseconds and converted into percentage.

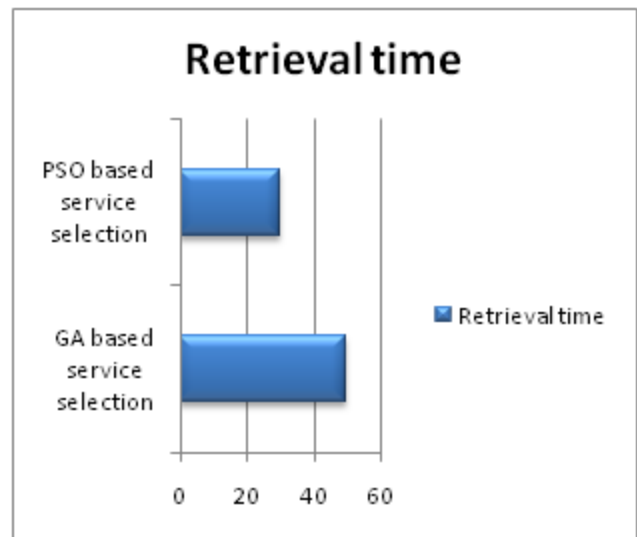


Fig 4: Performance evaluation

VI. CONCLUSION

Web service selection is a critical issue in dynamic Web service composition. To enhance the execution time of existing algorithm on dynamic Web service selection with global optimal QoS to satisfy user’s requirement better, based on particle swarm optimization. Experimental results emphasize the opinion that less computation and more particle components are more suitable for migration.

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