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A task allocation method considering
resource availability for providing services
to Home Network Environment

Yuta KIYOUMI (0810020)

School of Information Science,
Japan Advanced Institute of Science and Technology

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To make services used in a home network environment a reality, a new
model that introduces the notion of a Service Intermediary between the
Home Gateway and a Backend Service Provider is being proposed. Some
tasks that make service used in a home network environment a reality is
running at factor on the model. But, it remains possible that might lack of
resources, because the resources of the each factor are different. So in this
paper, we propose a task allocation method for this model, that considers
resource availability and the task's characteristics.

First, we define SI model that introduces the notion of a Service Inter-
mediary, the Home Gateway and a Backend Service Provider. We explain
SI model on the need for Home network services, and background. And,
we explain to make services used on the SI model a reality.

Next, we survey a load balancing, and method of a load balancer. In
this paper, we reference a method that is implemented by Dynamic ratio
mode of BIG-IP series by F5 Networks inc. The Dynamic ratio mode is
a Weighted Round Robin that is used the weight calculated by based on
the resources. So, we proposed the task allocation method using by the
competence score.

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The competence score is calculated by the resource's utilization and the task cost. The task cost is measure using the resource. The propose method select the factor have higher competence score, and decide to allocate by a task. To calculate by task cost, the feature coefficient is used. The feature coefficient indicates level of importance the resource for a task.

Then we evaluate the effectiveness of the proposed method using simulation on PC. In the simulation, we simulant the Home Security service using by home network environment. To evaluate a task cost and a feature coefficient, we experiment that change the number of the execution's tasks. To evaluate a competence score, we measure execute time of tasks.

Result of the experiment that measure the task cost, we found that the task cost is different by the number of the execution's tasks. So, there is a possibility that can't get correct task cost if some tasks is running and don't assign the correct feature coefficient. But, the feature coefficient is recalculated based on getting task cost, and is converged on correct value. So, we consider it possible that get correct the task cost, if repeat execution task.

Next, average execute time that is calculated by execute task on the factors, execute time on the factor that selected by competence score longer other factor's execute time. We consider the reason that the other task has the effectiveness for the execute time, and propose method isn't considered execute time of task. For this reason, we consider more effectiveness method that being considered resource and execute time.

Finally, we evaluate possible applications in several service usage scenarios. We survey several services that considering now. In consequence, task can be divided into some categories type of services. We consider that the categories decide the characteristics of task. Our propose method using this characteristics, so the effectiveness of propose method is more good by deciding feature coefficient tasks. And, propose method studies to repeat execute task. The parameters converge for effectual value based on information of last study. So, propose method is expected to operates effectively for system be operated in the long term like services of home network.

Future works, we propose new method considering execute time, and do verification for method on reality environment.