Resource Information Service for Multiple Cloud Providers

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Virtual Network Embedding (VNE)

The Virtual Network Embedding (VNE) problem is to map virtual resources to the physical infrastructure, i.e. a request from a user contains a (virtual) resource topology, which must be mapped to the physical topology of the provider. In the case of a federation of resource providers or multiple clouds the request is split in sub-parts, and then each sub-part it assigned to different provider. In order to split the request, we use a cost function, which calculates the cost for every virtual resource.

Resource Information Service (RIS)

The Resource Information Service (RIS) provides a complete distributed semantic backend for storing, querying, manipulating and discovering resources for cloud providers that take part in a federation. The RIS service supports the VNE (Virtual Network Embedding) problem in the federation, providing all the necessary information, and performing all the discovery tasks in the federation (finding available resources, providing overview utilization values). Furthermore, it supports the communication with the provider, for retrieving information and sending request. Also it supports the communication with the monitoring service for retrieving resource availability. RIS is based on Semantic technologies and it uses the Infrastructure Description Language (INDL).

We have successfully implemented the RIS service to support the NOVI project, which federates Future Internet Platforms such as PlanetLab and FEDERICA.

Discovery Framework for Dynamic Characteristics

The VNE algorithm requires resource information from a provider: static characteristics of the resources (i.e. hardware type and OS), dynamic characteristics (i.e. CPU utilization and free memory) and overview utilization information per platform. The retrieval of the dynamic characteristics, and especially the calls to monitoring service, introduces a huge overhead in the overall VNE algorithm. We are working towards a framework (integrated in RIS) that provides efficiently and fast the dynamic characteristics of the resources. Such a framework contributes in the following aspects:

- Speed up the local embedding algorithm, which requires the dynamic characteristics of the resources
- Make able the use of complex and more sophisticated cost functions, which use dynamic characteristics and overview utilization values of the provider's infrastructure.

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