

From SLA to vendor-neutral metrics: An intelligent knowledge-based approach for multi-cloud SLA-based broker

Víctor Rampérez, Javier Soriano, David Lizcano, Shadi Aljawarneh, Juan A. Lara

ISSN 0884-8173

DOI: 10.1002/int.22638

International Journal of Intelligent Systems

RESUMEN:

Cloud computing has been consolidated as a support for the vast majority of current and emerging technologies. However, there are some barriers that prevent the exploitation of the full potential of this technology. First, the major cloud providers currently put the onus of implementing the mechanisms that ensure compliance with the desired service levels on cloud consumers. However, consumers do not have the required expertise. Since each cloud provider exports a different set of low-level metrics, the strategies defined to ensure compliance with the established service-level agreement (SLA) are bound to a particular cloud provider. This fosters provider lock-in and prevents consumers from benefiting from the advantages of multi-cloud environments. This paper presents a solution to the problem of automatically translating SLAs into objectives expressed as metrics that can be measured across multiple cloud providers. First, we propose an intelligent knowledge-based system capable of automatically translating high-level SLAs defined by cloud consumers into a set of conditions expressed as vendor-neutral metrics, providing feedback to cloud consumers (intelligent tutoring system). Secondly, we present the set of vendor-neutral metrics and explain how they can be measured for the different cloud providers. Finally, we report a validation based on two use cases (IaaS and PaaS) in a multi-cloud environment formed by leading cloud providers. This evaluation has demonstrated that, thanks to the complementarity of the two solutions, cloud consumers can automatically and transparently exploit the multi-cloud in many application domains, as endorsed by the cloud experts consulted in the course of this study.

PALABRAS CLAVE:

Cloud Computing; Consumers; Vendor-neutral metrics; Multi-cloud environment; Service-level agreement.