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An Efficient and Trustworthy Resource Sharing Platform for Collaborative Cloud Computing

Abstract:

Advancements in cloud computing are leading to a promising future for collaborative cloud computing (CCC), where globally-scattered distributed cloud resources belonging to different organizations or individuals (i.e., entities) are collectively used in a cooperative manner to provide services. Due to the autonomous features of entities in CCC, the issues of resource management and reputation management must be jointly addressed in order to ensure the successful deployment of CCC. However, these two issues have typically been addressed separately in previous research efforts, and simply combining the two systems generates double overhead. Also, previous resource and reputation management methods are not sufficiently efficient or effective. By providing a single reputation value for each node, the methods cannot reflect the reputation of a node in providing individual types of resources. By always selecting the highest-reputed nodes, the methods fail to exploit node reputation in resource selection to fully and fairly utilize resources in the system and to meet users' diverse QoS demands. We propose a CCC platform, called Harmony, which integrates resource management and reputation management in a harmonious manner. Harmony incorporates three key innovations: integrated multi-faceted resource/reputation management, multi-QoS-oriented resource selection, and price-assisted resource/reputation control. The trace data we collected from an online trading platform implies the importance of multi-faceted reputation and the drawbacks of highest-reputed node selection. Simulations and trace-driven experiments on the real-world PlanetLab testbed show that Harmony outperforms existing resource management and reputation management systems in terms of QoS, efficiency and effectiveness.