Accepted Manuscript

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PII: S0167-739X(17)30486-7
DOI: https://doi.org/10.1016/j.future.2017.09.080
Reference: FUTURE 3736

To appear in: *Future Generation Computer Systems*

Received date : 6 April 2017
Revised date : 2 August 2017
Accepted date : 30 September 2017

Please cite this article as: S.Z. Goher, P. Bloodsworth, R. Ur Rasool, R. McClatchey, Cloud provider capacity augmentation through automated resource bartering, *Future Generation Computer Systems* (2017), https://doi.org/10.1016/j.future.2017.09.080

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ACCEPTED MANUSCRIPT

Cloud Provider Capacity Augmentation Through Automated Resource Bartering

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Abstract

Growing interest in Cloud Computing places a heavy workload on cloud providers which is becoming increasingly difficult for them to manage with their primary datacenter infrastructures. Resource limitations can make providers vulnerable to significant reputational damage and it often forces consumers to select services from the larger, more established companies, sometimes at a higher price. In order to increase their capacity, cloud providers need to invest heavily in costly hardware. Funding limitations commonly prevent emerging and even established providers from making continual investments of this type speculatively assuming a certain level of growth in demand. As an alternative, they may strive to use the current inter-cloud resource sharing platforms. These however mainly rely on monetary payments which can put pressure on already stretched cash flows and transaction costs may reduce profitability. To address such issues, we have designed and implemented a new multi-agent based Cloud Resource Bartering System (CRBS) that fosters the management and bartering of pooled resources without requiring costly financial transactions between providers. Unlike existing systems, CRBS assigns resources by considering resource urgency which comparatively improves customers' satisfaction and the resource utilization rate by more than 50%. The evaluation of CRBS provides evidence that it assists providers to timely acquire the additional resources and to maintain sustainable service delivery. We conclude that the existence of such a system is economically beneficial for cloud providers and enables them to adapt to fluctuating workloads.

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