Chapter 103
Modelling the Dynamics of Trust Across a Cloud Brokerage Environment

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ABSTRACT

The globalised nature of cloud computing presents us with new challenges towards the development of effective business relationships across a dynamic service ecosystem. While availing of additional service capabilities, organisations are tasked with managing unfamiliar relationships with unfamiliar cloud service providers to generate increased business value. This calls for more attention towards the concept of trust within a cloud service environment. Cloud computing presents new economic and flexible business and technological models which supports the co-creation nature of service quality and ultimately business value. This research examined various methods to assess service quality and service capability assessment. During the course of this work, the author has identified the need to revisit the concept of 'trust' within a cloud computing context and prescribe a method to model its complexity. The objective of this paper is to argue that, while cloud computing allows organisations to avail of increased service capabilities; it challenges the concept of trust. To support this argument the author presents the Cloud Services Trust Model to explain the dynamics of trust. In doing so, it introduces a notion of a distributed relational structure in service value co-creation. The paper also draws on theoretical developments to highlight the fundamental changes in the nature of service provision and how they impact on the assessment of service value and service quality. The author supports the need for greater transparency in the move towards greater accountability in the cloud ecosystem. The paper applies social network analysis (SNA) to model the trust relationships of a cloud brokerage environment.

1. INTRODUCTION

Cloud computing present's new economic and flexible business and technological models. In essence, cloud computing is a form of outsourcing whereby organisations typically outsource data, software, infrastructure, business and platform services. As a result, organisations place significant trust in other organisations to deliver a service. The explosive uptake of dynamic service solutions has fuelled the

growth of cloud services. However, to support cloud providers and users, it is critical that decisions regarding sourcing service capabilities are informed through some system of cloud service analytics. One critical element of decision-making is based on trust. The nature of risk and reward may differ within a cloud computing context (Carroll and Helfert, 2015) when compared to the traditional outsourcing environment (Lacity and Hirschheim, 1993). While risk has been well documented throughout outsourcing literature, for example, using frameworks such as COBIT 5, trust has not received similar attention within a cloud computing context. Trust encourages us to rely on a person or entity to generate some concept of value and sustains a relationship. Cloud brokerage can support companies to sustain business relationships. Cloud brokerage comprises of a third-party business which acts as an intermediary between the purchaser of a cloud computing service and the sellers of a particular service. Considering that cloud brokerage is a relatively new service model, trust can play a vital role in the transition towards cloud services. Trust places reliance on a person or entity which generates some concept of value towards the sustainability of relationships. In this paper, the author examines the concept of trust within a cloud context from a conceptual perspective. The paper demonstrates how social network analysis (SNA) presents us with an innovative technique to model trust across cloud brokerage networks. SNA allows us to reconsider how we design and model cloud service networks with particular interest in introducing service metrics to visualise and measure the value of cloud brokerage networks. Nair et al. (2010, p.192) explain that a cloud service broker "*creates a governed and secure cloud management platform to simplify the delivery of complex cloud services to cloud service customers*". This emphasises the need to understand the concept of trust and model the factors which enable customers to realise the full potential in availing of newfound cloud services. It also supports companies to enforce the correct service level agreements (SLAs) and IT policies between cloud providers and cloud service consumers. The literature suggests that there are many concerns about weak trust relationships across a service value web especially with regard to 'on-demand' service models which can have unforeseen consequences on their business activities (for example, Pearsons, 2011; Capgemini, 2012). The contribution of this work is the application of SNA to model trust relationships across a cloud brokerage service network. In doing so, the author introduces the Cloud Service Trust Model to explain the dynamics of trust. This work contributes towards our understanding of cloud service dependability and the establishment of cloud-specific service quality metrics.

It is worth noting that we should recognise that there are different aspects of trust in a human sense and in a technical sense when we consider cloud computing. Trust has two main core focuses of which the first one is human trust that forms exclusively inside a person driven by largely sub-conscious urges. That conforms fully with the axiom of human action. Thus, human action is fully served and accurately so with delivering information that allows for background checking using mashups in an electronic collaboration setting as, e.g., in a cloud-broker situation. The second trust-dimension is a somewhat "new" as it refers to artifacts in clouds such as, e.g., stateful (i.e. preserve their state for long running or distributed transactions) or stateless (i.e. responding to requests) services and their internal properties. Here, the meaning of trust focuses on how dependable and secure is an artefact, i.e. the properties of dependability and security (Avizienis et al. 2004). Thus, in a socio-technical collaboration setting using service-oriented cloud computing, those two orthogonal trust-dimensions must be considered in their distinct correlation. Note that human action may be considered in mathematical terms in a sense that it coincides with discrete system behaviour, for example, workflow nets. For the purpose of this paper, the author provides a conceptual scenario and begins the discussion on how we can model trust networks across a cloud service ecosystem.

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