A Generic, Cloud-Based Representation for Supply Chains (SC’s)

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ABSTRACT

As a very recent IT paradigm, Cloud Computing is gaining momentum and receiving more and more interest in literature. With various characteristics such as offering flexibility, cost reductions, platform independence and on-demand service, cloud approach opens up tremendous opportunities from Supply Chain (SC) perspective. However, extant literature reveals that adoption and assimilation of the technology is not mature in SC domain and cloud-based modelling initiatives are only recent. To fill this gap, this study discusses the opportunities of cloud computing from SC perspective and proposes a generic representation based on cloud philosophy. The proposed representation is conceptual, flexible and customizable, utilizing and highlighting the cloud benefits in a multi-partner setting. Therefore, this article is an answer to the research questions: “what are the opportunities of cloud philosophy for SC domain?” and “how can supply chains be represented generically based on cloud technology in multi-actor environment?”. Contribution of this study lies in comprehensive treatment of cloud computing and supply chain intersection as well as the generic representation.

Keywords: Cloud Computing, Collaboration, Flexible, Generic Representation, Supply Chain (SC)

1. INTRODUCTION

In the IT domain, Cloud computing is one of the most recent paradigms, receiving more and more interest in literature (Vaquera et al., 2009; Sterling & Stark, 2009). Increasing opportunities for improving IT efficiency and performance through centralization of resources and the maturation of technologies such as SOA, virtualization, grid computing, and management automation led to the natural outcome of what has become increasingly referred to as “cloud computing” (Oracle, 2009). Basic motivations behind the technology are: (a) The need for rapidly scalable elastic computing infrastructures, (b) The increased cost of traditional IT infrastructure, (c) Increased focus on service orientation (Yousif, 2009; IBM, 2008).

Cloud computing represents outsourcing of IT (infrastructure, service, platform, business processes), and enables on-demand access to IT resources from the provider generally on a pay-
This paradigm provides access to a shared pool of configurable resources (networks, servers, storage, applications and services) delivered over the Internet (Buyya, Broberg, & Goscinski, 2011; Sterling & Stark, 2009; Gartner, 2008a, b; Sosinsky, 2011; Raines, 2009). The approach is inherently compatible with the service oriented philosophy, enabling standardized access to IT resources for totally heterogeneous, diverse and distributed infrastructures without knowledge of the underlying system details. Cloud benefits from SOA, since cloud computing is directly related with provisioning and consumption of IT capabilities as a service over the web. Markz and Lozano (2010) emphasises this idea by mentioning that “Cloud builds on the shoulders of SOA”. Thus, cloud logically builds on the concepts of services. Services organization and orchestration inside the cloud can be managed in a SOA (Wang, Wang, & Lee 2009). Since the modularity, reusability, standardization of interfaces, interoperability, platform independence and scalability are the core issues, cloud approach can be conceived of as complementing the SOA paradigm, providing pay-for-use model for service oriented thinking (Sosinsky, 2011). This is also highlighted by Markz and Lozano, (2010), mentioning the “double play” between cloud and SOA, cloud pulling new SOA initiatives through and SOA enabling cloud initiatives from business, IT and infrastructural perspectives.

Representing the virtualization of resources, cloud computing provides the illusion of infinite computing resources available on demand, offers highly customizable, on-demand services and enables access for IT services without significant investment (Sagawa et al., 2009; Sterling & Stark, 2009; Sosinsky, 2011). It also provides: (a) the user to get rid of operating and maintenance costs in relation to IT (b) flexible, dynamic and efficient use of IT resources (c) Instantly scalable infrastructure and load balancing (d) rapid access to new resource capabilities without incurring the delays implicit in upgrading and expanding local resources and personnel to manage them (e) responsive delivery of services and higher service quality (Vaquera et al., 2009; Sterling & Stark, 2009; IBM, 2008). Naturally, issues of privacy, confidentiality, security, reliability and vendor lock-in stand out as the major concerns regarding the technology (Buyya, Broberg, & Goscinski, 2011, Sterling & Stark, 2009; Gartner, 2008; Sosinsky, 2011; Shacklett, 2011). In the SC domain, transition towards collaborating, web-enabled structures is well supported (Ross, 2003; Akyuz & Gursoy, 2011), and Web technologies appear as the greatest enabler of SC collaboration, enhancing information flow, avoiding information asymmetry and providing transparency and visibility among partners (Akyuz & Gursoy 2011). Connectivity and enterprise application integration of heterogeneous partner systems are in question among multiple partners within the supply networks. It is already well proven that SOA paradigm and extant EAI platforms of major vendors offer significant solutions in this regard (Rehan & Akyuz, 2010) and SOA paradigm received a certain degree of assimilation. However, cloud computing appears as a more recent technology and its assimilation in SC domain is not mature yet, with cloud-based modelling efforts are only recent (Cheng et al., 2011; Ryu, Nakayama, & Onari, 2011).

Hence, the reasons for selecting the intersection of cloud-collaborative supply chain domains are multifold: a) investigating the state-of-the-art cloud technology from the perspective of recent collaborative SC paradigm b) identifying cloud opportunities for multi actor connectivity and collaboration c) providing a cloud-based, generic representation for collaborative context.

With this understanding, rest of the paper is structured as follows: Section 2 focuses on cloud computing from supply chain perspective, discussing all the advantages, disadvantages and enabler effect with respect to SC s. Section 3 offers a generic, cloud-based model. Section 4 provides a comprehensive discussion of the suggested model and Section 5 concludes with further research suggestions. Hence, the paper is beneficial for audience from both IT and SC domains.
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