Chapter 1
Cloud Computing and Frameworks for Organisational Cloud Adoption

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ABSTRACT

This chapter presents a selected review for Cloud Computing and explains the issues and risks of adopting Cloud Computing in a business environment. Although all the risks identified may be associated with two major Cloud adoption challenges, a framework is required to support organisations as they begin to use Cloud and minimise risks of Cloud adoption. Eleven Cloud Computing frameworks are investigated and a comparison of their strengths and limitations is made. The result of the comparison is that none of them can deal with all the Cloud adoption challenges thoroughly and a new, comprehensive framework is required if organisations are to overcome these challenges. This proposed framework would ensure that benefits of Cloud adoption are maximised whilst minimising the risks of Cloud adoption and can integrate existing and new projects with Leeds Beckett Cloud.

1. INTRODUCTION

Cloud Computing has transformed the way many organisations work and offers added value for operation management and service computing. Researchers have demonstrated the positive impacts Cloud can offer for business engineering and service level management (Ambrust et al., 2009; Brandic et al., 2009; Buyya et al, 2009). Ambrust et al. (2009) identified cost reduction in IT services from using Cloud Computing. They also presented their Cloud Computing economics and ten major challenges for Cloud Computing. They emphasise a shift of risk from maintaining

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data centres and the capital costs of running them to the loss of data while managing Clouds in a demand-based model. Buyya et al. (2009) assert that Cloud Computing offers billing-based Service Level Agreements (SLA) which can be used for operational management offering cost savings and streamlining business activities and processes. In addition, Cloud Computing offers a variety of other benefits including agility, resource consolidation, business opportunities and green IT (Foster et al; 2008; Weinhardt et al. 2009 a; 2009 b; Schubert, Jeffery and Neidecker-Lutz, 2010; Kagermann et al., 2011; Khajeh-Hosseini et al., 2010 a; 2010 b; Chang et al., 2010 a; 2010 b; 2011 b; 2011 c; 2013 a; 2014).

There is an increasing number of organisations offering Cloud Computing products and services in industry. Salesforce.com is a pioneer in Cloud Computing and offers their Customer Relation Management (CRM) applications to a large number of their users. Amazon is the market leader in Public Cloud Computing and offers Elastic Compute Cloud (EC2) for computing capacity and Simple Storage Service (S3) for storage capacity. Microsoft provides Windows Azure services for developers to store their code and develop new applications for their clients or companies. IBM and Oracle (following their acquisition of Sun Microsystems) both offer products and services ranging from hardware to application services. In addition, there are many more Small and Medium Enterprises (SMEs), who can offer different types of business models and perspective (Marston, et al., 2010), developing and selling Cloud Computing services and products.

Computing Clouds are commonly classified into Public Clouds, Private Clouds and Hybrid Clouds (Ahronovitz et al., 2010; Boss et al., 2007; Marston et al., 2011). Cloud adoption is dependent on the type of Clouds and the intended use for the deployment. For small organisations that aim to save cost and test their software products before release, using public clouds is a good option (Khajeh-Hosseini et al., 2010 a; 2010 b). For organisations that have sensitive data and have data ownership and privacy concern, hosting private clouds is more suitable. Chang et al (2011 a; 2013 a; 2013 b) demonstrate the use of private clouds designed and adopted in finance and healthcare sectors. Hybrid clouds may be used for large-scale simulations and experiments, since they allow scientists at different sites to work and collaborate with one another (Ahronovitz et al., 2010; Khajeh-Hosseini et al., 2010 a; 2010 b).

The majority of Cloud literature defines a Cloud Computing Framework as a Service Oriented Architecture (SOA) (Foster et al; 2008; IBM, 2008; Dillion et al. 2010; Chang et al., 2010 a; 2010 b; 2013 a; Schubert, Jeffery and Neidecker-Lutz, 2010) offering one of three types of service: Infrastructure as a Service (IaaS); Platform as a Service (PaaS) and Software as a Service (SaaS).

Lin et al. (2009) provide an overview of industrial solutions for Cloud Computing, and summarise the list of challenges for the enterprise. They state that adoption benefits of cost and flexibility are enterprise-ready, but security, performance and interoperability need significant improvement. There are two issues to be resolved for each of security, performance and interoperability.

The remainder of this article is structured as follows. Section 2 presents motivation for organisations adopt Cloud Computing and Section 3 describes technical review for Cloud Computing. Section 4 explains Cloud business models and Section 5 lists risk factors and categorises them into Cloud adoption challenges from stakeholders' points of views, which leads to Section 6 that a framework for Cloud Computing is necessary. Section 7 evaluates a shortlist of eleven frameworks for Cloud Computing and concludes that none of them addresses all Cloud adoption challenges fully so that a new framework is required. Sections 7 and 8 explain our proposal for the framework. Section 8 discusses two topics related to the proposed framework and Section 9 sums up Conclusion and Future Work.