


Chapter 16

Selection of Cloud Delivery and Deployment Models: An Expert System Approach

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ABSTRACT

Research interests on cloud computing adoption and its effectiveness in terms of cost and time has been increasing. However, one of the challenging decisions facing management in adopting cloud services is taking on the right combinations of cloud service delivery and deployment models. A comprehensive review of literature revealed a lack of research addressing this selection decision problem. To fill this research gap, this article proposes an expert system approach for managers to decide on the right combination of service delivery and deployment model selection. The article first proposes a rule-based expert system prototype, which provides advice based on a set of factors that represent the organizational conditions and requirements pertaining to cloud computing adoption. Next, the authors evaluate the system prototype. Lastly, the article concludes with a discussion of the results, its practical implications, limitations, and further research directions.

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INTRODUCTION

Recent statistics on cloud computing indicates a steady growth in adoption and technological development. A very recent survey, of 1002 IT professionals, on cloud computing trends reveals that 85 percent of enterprises represented by respondents have multi-cloud strategy up from 82 percent in 2016. Private cloud adoption reached 72 percent, and the hybrid cloud adoption reached 67 percent (Weins, 2017). More awareness of cloud computing capabilities leads to higher cloud adoption (Tashkandi & Al-Jabri, 2015; Al-Jabri & Alabdulhadi, 2016). Cloud computing represents a shift of computing paradigm towards outsourcing of computing services with the flexibility and scalability, the need for low budget, and measured services (Catteddu & Hogben, 2009; Azadegan & Teich, 2010). For many businesses, cloud computing represents an attractive option in terms of cost saving in establishing and maintaining IT resources.

The cloud computing industry offers businesses different adoption scenarios. Businesses face a number of challenging decisions with respect to adopting cloud computing. For example, one of the challenges is the selection of a cloud service delivery model, from alternate options like SaaS, PaaS, or IaaS. Further, another challenging decision is the choice of deployment model amongst the common models (Private, Public, Hybrid, or Community). This decision will involve considering organizational factors, business information needs, and budget requirements. These challenging decisions require due consideration of several factors, which in turn generate multiple decision scenarios simultaneously. A review of existing literature revealed a lack of research work in addressing the choice of cloud service delivery and deployment models pertaining to managerial decision making of cloud computing adoption. Thus, the objective of this paper is to fill the research gap by proposing an expert system prototype and evaluate its effectiveness to support management in addressing these twin issues of selection decisions for managing the adoption of cloud computing.

The rest of the paper is organized in the following manner. A literature review on cloud computing is given. It focused on cloud computing technology, cloud computing models and the characteristics of service delivery and deployment models. In, addition, the review provides an overview of the relevant decision-making approaches including expert system and multi-criteria decision analysis. Then, the research method follows, which explains how the authors address the study objectives, by proposing an expert system. Next, the paper evaluates the proposed expert system effectiveness. Then, the paper discusses the research results. Lastly, the conclusion summarizes the study and addresses its limitations. This paper makes a significant contribution to existing literature. Being the first paper of its kind to propose the expert system approach, this research will provide new insights into and extend our understanding of managing cloud-computing adoption.

CLOUD COMPUTING

The National Institute of Standards and Technology (NIST) defines cloud computing as, “A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Mell and Grance, 2011). Moreover, NIST pronounced five common characteristics for cloud computing, including on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service. In the current era of

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