Chapter  8
Cloud Computing:
A Decision Framework for
Small Businesses

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ABSTRACT

Cloud computing technology is garnering success with marketing-based wisdom-like stories of savings, ease of use, and increased flexibility in controlling how resources are acquired at any given time to deliver computing capability. This chapter develops a preliminary decision framework to assist managers who are determining which cloud solution matches their specific requirements and evaluating the numerous commercial claims (in many cases unsubstantiated) of a cloud’s value. This decision framework is the result of the authors’ research program in understanding how small to medium-sized businesses can assess the potential benefit from cloud computing helps managers allocate investments and assess cloud alternatives that now compete with in-house data centers that previously stored, accessed, and processed data or with another company’s (outsourced) datacenter resources.

INTRODUCTION

Cloud computing is a new computing paradigm in which an IT user does not have to physically access, control (operate), or own any computing infrastructure other than, perhaps, workstations, routers and switches, and, more recently, mobile client devices. Rather, the user “rents or leases” computational resources (time, bandwidth, storage, etc.) in part or whole, from some external entity. The resources are accessed and managed through logical and electronic means. A cloud architecture can be physically visualized as the arrangement of large to massive numbers of computers in distributed data centers to deliver applications and services via a utility model. In

DOI: 10.4018/978-1-4666-2187-9.ch008
Confusion exists about the nature of cloud computing. Gartner asserts that a key characteristic is that it is "massively scalable" (DeSisto, Plummer and Smith 2008). Originally, cloud computing was proposed as a solution to deliver large-scale computing resources to the scientific community for individual users who could not afford to make the huge investments in permanent infrastructure or specialized tools, or could not lease needed infrastructure and computing services.

It evolved, rapidly, into a medium of storage and computation for Internet users that offers economies of scale in several areas. The Pew Internet and American Life Project (Horrigan 2008) noted that 69% of Internet users have data stored on-line or use web-based software applications. Examples include various email services (HotMail, Gmail, etc.), personal photo storage (Flickr), social networking sites (FaceBook, MySpace) or instant communication (Skype Chat, Twitter). This approach represents a major shift in the geography of computation analogous to the service bureau concept of the mid-20th century. Recently, large corporations are beginning to develop "private" clouds to host their own applications in order to protect their corporate data and proprietary applications while still capturing significant economies of scale in hardware, software, or support services.

Rather than providing the user with a permanent server to connect to when application execution is required, cloud computing provides "virtualized servers" chosen from a pool of servers at one of the available data centers. A user’s request for execution of a web application is directed to one of the available servers that have the required operating environment, tools, and application locally installed. Within a data center, almost any application can be run on any server. The user knows neither the physical server nor, in many cases, where it is physically located, i.e., it is locationally irrelevant.

Most people think of cloud computing as a publicly available resource. We suggest that cloud computing is a viable business computational model for small to medium businesses who cannot afford large investments in permanent infrastructure. For cloud computing to succeed, they must be able to run their own tailored or uniquely configured applications in the cloud, a capability available in the scientific community, but not yet required in the personal and corporate usage community.

As part of our research program in understanding how small to medium-sized businesses can assess the potential benefit from cloud computing, we surveyed over 80 research articles from conferences, symposia, and journals, blogs, white papers, commercial announcements and claims, standards, and books to develop factors to incorporate in a decision model when considering moving to or adopting cloud computing. Our literature review found no single comparative model, but rather competing perspectives that describe the thing referred to as "cloud".

We have identified three broad perspectives in the literature that suggest why no single decision model has emerged to date. These perspectives have been used to construct a decision framework that assesses: services offered, vendor strategies, and cloud technical/architectural evolution. An analogy may help make the point. If you wish to serve a salad at a meal, you have many choices of ingredients, but that may not be the critical issue. You can buy all of your own ingredients, and mix yourself as required by the guests or you can buy a prepackaged bag of mix, and add some special treats (walnuts, tomatoes, carrots, etc.). Alternatives are greatly influenced by what is offered by a vendor (and vendor margins). Shop at a big store, and get premixed salads or buy the individual items when offered. As cloud proponents assert, any of the above options may be more efficient (and cheaper) than buying and managing your own vegetable farm (unless you already own the
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