Research Report

Adaptation and Perception of Cloud Computing in German Banks

BASED ON THE RESULTS OF A MULTI-PARTICIPANT CASE STUDY THAT WAS CONDUCTED IN THE COURSE OF THE YEAR 2011, THIS ARTICLE OUTLINES THE CURRENT UTILIZATION AND ASSESSMENT OF CLOUD COMPUTING BY GERMAN BANKS.

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Introduction

Cloud computing is a novel IT paradigm which promises to deliver IT services in a utility-like manner, i.e., flexible, scalable, and on-demand, based on a fine-granular billing scheme (Buyya et al., 2009). Due to the recent market entry of various widely recognized providers, cloud computing has not only sparked interest among private consumers and the scientific community, but has also gained increasing popularity among enterprise IT users.

In the period from January to August 2011, we have conducted a case study involving ten interviews with representatives of German banks and finance-oriented IT service providers. The aim of this study was to qualitatively examine the current perception and adaptation of cloud computing in the German financial industry; the main findings are presented in the following.

What's Cloud Computing, anyway?

Despite its high popularity, no commonly agreed-on definition of cloud computing exists at present. However, most of the interviewees in our study either implicitly or explicitly agreed on the popular definition by the National Institute of Standards and Technology (NIST), which not only defines a set of essential characteristics, but also common deployment and service models (Mell and Grance, 2011).

The former models involve, among others, private clouds, which are either operated in-house by the cloud user himself or exclusively supplied through a third-party, as well as public clouds, which are offered by dedicated providers and open to the general public. Common service models include infrastructures (such as storage or virtual machines), platforms (software development and execution environments), and software (complex software systems). An overview is provided in Figure 1.

Current State of Adaptation

All banks in our case study had, at the time of the interviews, adopted the cloud computing paradigm in the form of in-house clouds. The share of IT services that follow the cloud computing paradigm ranged from 10% to 30%. Similar numbers were reported by the IT service providers with respect to their product portfolios.

In general, clouds are predominantly deployed and used by banks internally, where a focus lies on the provision of infrastructure services, specifically, virtual machines and storage. Interestingly, most inhouse clouds at German banks do not fully adhere to the NIST definition, because they lack some of the essential characteristics, such as automated resource provisioning or billing.

In fact, in their early state, cloud initiatives appear to be predominantly characterized by the application of virtualization technologies to existing physical infrastructure. However, our study indicates that banks are currently undertaking substantial effort to overcome these deficits, both through the introduction of additional technical features (e.g., self-service resource provisioning interfaces), as well as through the development of cloud-oriented governance structures.

Third-party cloud services are utilized in a rather selective manner, commonly according to a pri-

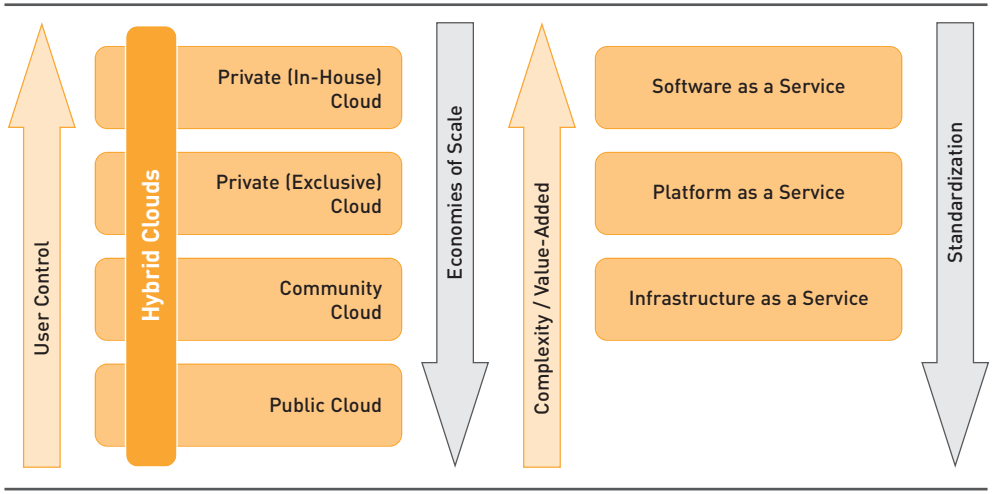

Figure 1: Common deployment and service models in cloud computing, adapted from the NIST definition (Mell and Grance, 2011)

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vate, rather than public deployment model. In contrast to the in-house clouds, the focus lies on software and platform services, rather than infrastructure offers. Specifically, services which are considered "commodities", such as messaging, are supplied through third-party clouds. However, it remains somewhat questionable whether these services can be considered actual cloud offers – in fact, many of them have existed long before the term gained general popularity.

The Pros: Motivation & Benefits

Not very surprisingly, the expectation to cut costs is the main driver for the introduction of cloud computing, according to the representatives of German banks. Cost reduction is also considered a major sales point by IT service providers. On the one hand, banks are hoping to more efficiently exploit their existing infrastructure through the adaptation of cloud principles and technologies. On the other hand, they expect to convert fixed into variable costs through the exploitation of pay-per-use models in third-party clouds. In this context, an additional benefit is seen in the possibility to control and attribute IT costs in a very fine-granular manner.

Most interview partners agreed that a reduction of overall IT costs could be achieved through the introduction of cloud computing. Yet, it remains somewhat questionable whether these effects can be attributed to cloud computing as a whole or rather to the use of virtualization technologies, which permits an effective consolidation of physical machines. The potential for cost reductions due to the use of third-party clouds is seen more controversially. Some interviewees specifically pointed to the potentially high costs of integrating internal and external cloud systems. In addition, some bank representatives doubted the benefits of a pay-per-use billing scheme in third-party clouds, stating that many applications were characterized by constant, rather than fluctuating load. Apart from cost reductions, actual benefits are seen in the scalability of cloud systems, which may result in performance improvements for certain applications. In addition, a reduction of IT provision times and thus, time-to-market, were named as major advantages.

The Cons: Obstacles & Drawbacks

According to our interview partners, the main obstacle for a more widespread adoption of cloud computing – specifically, third-party cloud services – consists in security and compliance concerns. In this context, the interviewees explicitly pointed to the strict data privacy laws in Germany and Europe. However, most bank representatives agreed that such issues could probably be resolved in the context of private cloud computing, based on appropriate legal agreements. This view is naturally shared by IT service providers; in fact, some argued that the use of third-party cloud offers could actually result in security improvements. With respect to public cloud computing offers, the interviewed bank representatives expressed doubts that the technical and legal obstacles could be quickly resolved; the general assessment was that, at present, public cloud computing offers could hardly be utilized in compliance with legal and regulatory requirements, except in selected use cases, such as the use of virtual machines for software testing purposes.

An additional aspect of concern for banks is the risk of vendor lock-in, which is aggravated by a lack of standardization in cloud computing at present.

Based on their practical cloud computing experience, most banks have further identified the need for the development of cloud-oriented governance mechanisms. According to one interviewee, for instance, a novel challenge consists in the treatment of competing resource demands within a shared (virtualized) infrastructure.

Tomorrow's Forecast: Cloudy?

All respondents in our study expect a more widespread adoption of cloud computing in the future. The question whether the utilization of third-party cloud services will serve as a substitute or rather as a complement to the in-house provision of IT services sparked some controversy. The majority of the interviewees believe that third-party cloud services will play a more dominant role in the future, but within a hybrid cloud environment consisting of internal and external services. Accordingly, the role of IT departments is expected to somewhat shift from operations to supplier management in the future. Other interviewees believe that, in accordance with the cloud computing vision, IT services will truly become a utility in the future, thus essentially eliminating the need for in-house IT provision in the long run.

With respect to security and compliance issues, the idea of a "German cloud" raises some interest, as does the concept of community clouds that are operated by multiple banks conjointly. Through such models, economies of scale in large clouds could be exploited, while banks would still be able to pursue security and compliance objectives in an effective manner.

Conclusions

In summary, the results of our case study indicate that cloud computing has made its arrival in German banks. However, the adaptation of this novel paradigm can still be considered in its infancy, due to the fact that clouds are predominantly operated and used internally and, at the same time, lack some of the essential characteristics that would permit additional cost savings over traditional IT infrastructures. In addition, external cloud services are used in a very selective manner at present. However, it appears that both banks and IT service providers are currently undertaking substantial efforts to evolve cloud computing to a more mature state, thus also addressing common security and compliance concerns.

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