Cloud Computing in Education: The Intersection of Challenges and Opportunities

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Abstract. In the last few years, in spite of concerns about the hype, cloud computing has expanded steadily both horizontally – across industries, and vertically – in organizations’ technology stacks. Most technologies that enable cloud services existed prior to cloud computing’s existence, although these days they rejuvenate, evolve and stimulate the computational ecosystem transformations. Actually the radical change for organizations is in rethinking and reengineering their traditional IT resources advancing them with cloud architectures and implementing services based on cloud computing delivery models. The change is underway on a large scale: from vendors and developers to providers and customers, and the key issues of “cloudiness” are not only in economics and management, but in provisioning, interoperability and security of the integrated services.

The Cloud Computing phenomenon likewise creates exciting challenges and opportunities for the entire educational system. For faculty, students, administration, and IT professionals it is a thrilling journey driven by many agendas – cost cutting, delivering dynamic mobile and interactive computational services, utilizing and leveraging integrated IT infrastructures and systems. This talk will explore the impact of cloud computing on the educational socio-technical system and will provide the author’s experience in strategizing and utilizing cloud-based applications and services.

Keywords: Cloud computing, Virtualization, On-demand services, Cloud-based services, On-line learning systems.

1 Introduction

In the last few years, cloud computing has expanded steadily both horizontally – across industries, and vertically – in organizations’ information technology stack such as raw computing and storage, databases and system’s utilities, e-collaborative tools and enterprise applications. Insightful businesses and organizations grasp the “cloud” ideas discerning what the cloud computing services and models are and how they can utilize them as vendors, providers, or users to create a competitive advantage.

Naturally, as it is with any imaginative idea, the “cloud” and its technologies suffer from confusion and hype. In the latest Gartner’s Hype Cycle for Emerging Technologies from 2010, the cloud computing and cloud/web platforms overall just topped the peak of inflated expectations, while private cloud computing is still in rising curve [1].
Although there is substantial interest in the scalability and cost efficiency of cloud computing services, most organizations are still approaching this development cautiously until they have a more complete picture of the risks involved. Competing vendors and lack of standardization, various security threats and undefined risks evolving new business and delivering models, and ambiguous “cloudness” services are slowing down overall the adoption. In spite of present concerns, the most recent Gartner’s worldwide survey of executives reveals an increasingly faster than originaly expected, implementation of cloud services. While recently only 3 percent of CIOs reported running their IT services in the cloud, over the next four years the expectations are this number will rise up to 43 percent [2].

The Cloud Computing phenomenon likewise creates exciting challenges and opportunities for the entire educational system. For faculty, students, administration, and IT professionals it is a thrilling journey driven by many agendas – cost cutting, delivering dynamic mobile and interactive computational services, utilizing and leveraging integrated IT infrastructures and systems. The immense economic demands in the last several years, in conjunction with the immediate reduction of upfront capital and operational costs when cloud-based services are employed, increase the speed and the scale of cloud computing adoption at educational institutions.

In the next sections, the IT Scale of Changes and the Impact of Cloud Computing development on the educational socio-technical system are explored in greater details. The findings are based on interviews with IT leading professionals from the US Higher Education system, and the author’s experience in strategizing and utilizing cloud-based applications and services for teaching, learning, research and creative inquiry.

2 The Scale of IT Changes

The radical change for organizations is in rethinking and reengineering their traditional IT resources. The process of change starts with answering questions such as: “Where, and How does the IT Adds Value in the Higher Education Institution (HEI)?” “What IT academic community needs to meet the growing requirements within shrinking budgets?” “Would IT advance with cloud architectures and integrated cloud-based services, and When?”

This range of questions could be broader; however, answering to these considerations can help us to define and understand the scale of changes already in progress: from vendors and developers to providers and customers. The critical challenges, and, in the same time imperative opportunities for HEI are how to keep the pace with the rapid proliferation of emerging technologies, portable information resources and tools, and to balance the effects and magnitude of changes within the unadventurous educational ecosystem.

2.1 IT in the Organizational Context of HEI

To explore the complexity of the questions and to evade overoptimistic expectations and benefits when employing new technologies and service models, a formal approach of evaluating IT in the organizational context can be applied. In the “Information Systems for Managers” text, the author Gabriele Piccoli emphasizes IT as a critical component of a formal, sociotechnical information system designed to collect, process, store and, distribute information [3].