

# Cloud Computing Environments

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## INTRODUCTION

Cloud computing is a commonly used buzz word by Information Technology professionals and their managers worldwide but is still widely misunderstood. “These days it’s not only about running IT efficiently, but also about supporting core business strategies and helping create strategic advantage by reducing cost and driving innovation. CIOs are being asked to do more for the business with fewer resources” (Scicast, 2011). The environments made available through Cloud Computing enables CIOs and other technology leaders and end users to meet those financial and IT efficiency goals. The description of Cloud Computing Environments discussed in this section will attempt to lift some of the fog surrounding those seeking to understand what Cloud Computing really means and how they can use it personally or within their organizations.

“Cloud computing is a model for enabling ubiquitous, 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 & Grance, 2011). There are a few different choices one can make when implementing Cloud Computing and often those choices are driven by many different factors. The four main types of Cloud deployments are Private, Public, Hybrid, and Community. Each of the Cloud deployment options will be discussed in detail in later sections.

In addition to the deployment option a service model must be chosen as well. There are three primary service models one may choose depending on what their goals for the Cloud Environment they are deploy-

ing are to be. Each of these models will be described in greater detail in later sections. The service models are Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). The service models work to meet the specific needs of the customer much like the experience one would have when purchasing any other service such as cable television or telephone. With those services a customer can order only what they would like in a fully customized or a la carte fashion or purchase a bundle of services where everything is already packaged together for them preconfigured and ready to go. (Buyya, Yeo, Srikumar, Broburg, & Brandic, 2009) Each service model should be carefully considered for the options it provides and weighed against business and suitability factors prior to making the selection.

Once the Cloud deployment and service models are chosen, or perhaps before, a formal business case should be raised to support the decisions. Sometimes in working the business case and forming and comparing different scenarios and alternatives it may be discovered that Cloud might not be the best solution to meet the needs of the individual or organization doing the analysis. It is okay to recognize that Cloud Computing is not always the best solution for all organizations or individuals regardless of the hype and excitement surrounding the push to move to Cloud Computing Environments. As circumstances change a re-examination of the findings uncovered during the analysis should be performed. It is possible that at the time of investigation Cloud was not the best solution but changes that took place since the analysis was completed might change the result. Diligence is required to understand what Cloud Computing is, what environment is best, if any, and the importance of annually re-examination of requirements when Cloud Environments were not selected initially.

This re-examination allows the seeker to account for the changes in Cloud Computing technology as well as changes in the size or mission of the organization seeking to move to a Cloud Computing Environment.

## BACKGROUND

Cloud Computing Environments have their roots in Service Oriented Architecture (SOA), Data Centers, Virtualization Technology, and even Green Computing. SOA was popular by providing service choices to end-users that were available from the provider often in a single location simply by the click of a mouse button. A SOA framework operates by calling the application or service from wherever it was residing and instantly delivering it to the end-user. For this to be possible techniques such as virtualization were employed.

“Virtualization is the abstraction of IT resources that masks the physical nature and boundaries of those resources from resource users.” (Gartner, 2012) Some of the top companies specializing in virtualization solutions are VMWare and Sun Microsystems. Virtualizing an operating system allows a user to run multiple versions of an operating system on the same physical hardware. In the SOA environment this enabled application owners to make available multiple applications or services to end-users on a single physical appliance as long as that appliance had virtualization software installed that supported all platforms running on its hardware.

SOA and virtualization techniques promoted green computing by saving power, space, and cooling thus reducing the overall utility usage for the services provided. Data Centers with virtualization and SOA dashboards and frameworks were being promoted by vendors across the technology industry with no solid tie to bring them all together. The convergence of these technologies and other related technologies gave birth to Cloud Computing.

The idea of all of these great ideas together as Cloud Computing excited IT professionals and leaders worldwide. “It implies reduced information technology overhead for the end-user, great flexibility, reduced total cost of ownership, on demand services and many other things.” (Vouk, 2008) In addition to the technologies

contributing to the increase in Cloud Computing’s popularity, the expected cost savings, as mentioned by Vouk, has proven a major driver in decisions to move toward Cloud Environments versus traditional Information Technology (IT) Infrastructures.

The flexibility that is provided through Cloud Computing is expressed by the choices it provides in its deployment options and service models. Table 1 defines each deployment option and Table 2 provides definitions of each service model.

## COMPARING TRADITIONAL IT DEPLOYMENTS AND CLOUD COMPUTING DEPLOYMENTS

Often the decision to deploy Cloud Computing Environments versus a traditional IT architecture comes from hype or political pressure within the organization. If decision makers are better informed on the difference between the two types of environments and the benefits each would add, or not, to their organization more informed decisions would result. Cloud Computing Environments are not for every individual or organization but can produce great benefits over traditional IT in the environments that suit them best.

Traditional IT infrastructures are often chosen by companies or individuals who have already invested significant capital in their IT infrastructure. Many have built full scale data centers and have already employed virtualization within their data center.

Figure 1 Shows the different deployment options available in a Cloud Computing Environments to allow the reader to see the flexibility that deploying to a cloud environment can provide. Figure 2 shows an illustration of the Cloud Computing service models that further demonstrates the flexibility of cloud environments. Lastly, Figure 3 depicts traditional IT environment deployment option to be used if the Cloud Deployment options are yet a suitable deployment option.

Earlier in this section reasons why one would choose traditional IT was discussed. IT professionals and leaders choose cloud technologies for their cost savings, flexibility and efficiency. The primary concerns for cloud adopters are security and data accessibility. If

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