

# Cloud Computing Environment

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## Abstract

*Choosing software for the cloud computing environment is important. However, the success of the cloud computing group depends more on having good processes and good people than on the particular software found on their desktops. In this paper we have discussed some of the more formal aspects of cloud computing environmental aspects in theoretically. It is not very difficult to implement this technology, and literature describing the basic techniques is available. The various generalizations described here must be brought into one coherent theory, and the technical implications of real life implementation must be considered.*

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**Keywords** Cloud environment, service models, infrastructure, distributed clouds, cloud security, cloud management, cloud strategies

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## 1. Introduction

Cloud computing is a distributed technology which delivers hosted services over the internet to provide easy access to IT services. These services are very flexible. A user can obtain a little or a big part of the service which is managed by the service provider. There are two types of clouds available: Public cloud and Private cloud. A public cloud can be accessed by anyone on the internet but the private cloud is accessible only for the limited number of users. Cloud computing is a synonym for distributed computing over a network, and means the ability to run a program or application on many connected computers at the same time. The phrase also more commonly refers to network-based services, which appear to be provided by real server hardware, and are in fact served up by virtual hardware, simulated by software running on one or more real machines. The cloud also focuses on maximizing the effectiveness of the shared resources companies have varying reasons for considering outsourcing cloud computing. For some, computing is only an occasional need and so not worth investing in an internal group. For others, cloud computing is an ongoing requirement, but the skills required seem so different from the ones currently available in the company that building this expertise

from scratch would be very challenging. Still others have their customer data hosted by an outside vendor and feel that the analysis should take place close to the data. Cloud vendors are experiencing growth rates of 80% per annum. The goal of cloud computing is to allow users to take benefit from all of these technologies, without the need for deep knowledge about or expertise with each one of them. The cloud aims to cut costs, and help the users focus on their core business instead of being impeded by IT obstacles [2].

## 2. Models

Cloud computing providers of services according to several fundamental models. Such as infrastructure, platform, software, strategy, collaboration, business, database, network and communication as part of the basic cloud computing domain models [2].

## 3. Cloud Clients

Network based user interface devices using in cloud computing such as Personnel computers, laptops, tabs and smartphones. Some of these devices – *cloud clients* – rely on cloud computing for all or a majority of their applications so as to be essentially useless without it. There are some cloud applications do not require specific software on the client and instead use a web browser to interact with the cloud application [2].

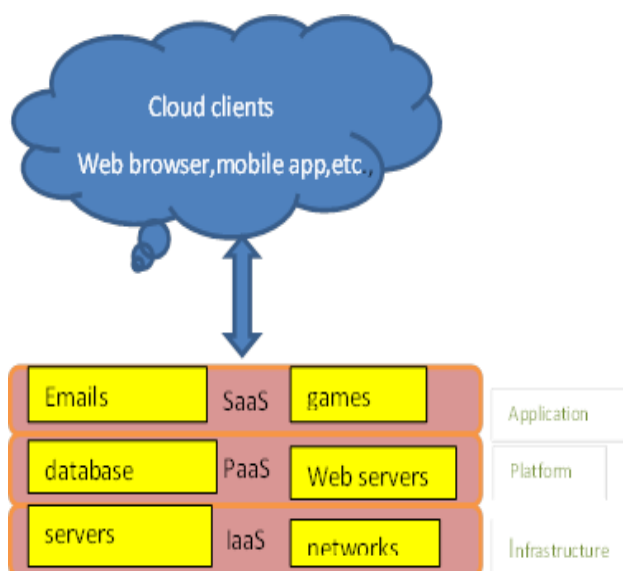


Figure 1: Service models of cloud computing

#### 4. Software as a service

This type of service allows thousands of users to access a single application through the browser or some kind of front end portal using multi-tenant architecture where a single instance of software runs on a server, serving thousands of customers. It's a profitable system for customers, where there's no need for investing in servers and software licenses. In the service providers' point of view, it's just one application to maintain, so maintenance costs are very low. SaaS is commonly used on HR applications. But, it can be anything from web based email services to inventory control systems. In addition, with applications hosted centrally, updates can be released without the need for users to install new software. One drawback of SaaS is that the users' data are stored on the cloud provider's server. As a result, there could be unauthorized access to the data. For this reason, users are increasingly adopting intelligent third-party key management systems to help secure their data.

#### 5. Platform as a service

This is a variation of a SaaS. It provides a development environment for developers to create applications on the platform over the internet using development tools hosted on the service provider's platform. Usage of this service is not totally convenient to developers, as the development tools are limited to vendor's architecture. But they can achieve predictability and pre-integration. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers [2].

#### 6. Infrastructure-as-a-service

This type of services provides virtual server instances with a unique IP address and storage. Users can access the server using the service provider's API to start, stop and configure the server. In the enterprise, cloud computing allows a company to pay for only as much

capacity as is needed, yet purchase more capacity whenever required. For wide-area connectivity, customers can use either the Internet or carrier clouds (dedicated virtual private networks) [2].

#### 7. Web Services

Rather than delivering the whole application, this system offer web services APIs to developers to develop services over the internet. They're available as discrete business services to the total APIs offered by Google Maps, ADP Payroll Process, the US Postal Service and Bloomberg [2].

#### 8. Service Providers

A managed service is an application exposed to IT rather than to end-users. These service providers provide infrastructure management services such as network-based services, applications and equipment to enterprises on subscription basis. Managing the information flow in a hybrid cloud environment is also a significant challenge. On-premises clouds must share information with applications hosted off-premises by public cloud providers and this information may change constantly. In addition to these services, the MSP can manage and integrate arrange of enterprise networks associated activities including Web hosting, Virtual Private Network (VPN), unified messaging, video networking etc. Management tools for private clouds tend to be service driven, as opposed to resource driven, because cloud environments are typically highly virtualized and organized in terms of portable workloads. Enterprises with large-scale cloud implementations may require more robust cloud management tools that include specific characteristics, such as the ability to manage multiple platforms from a single point of reference, include intelligent analytics to automate processes like application lifecycle management. Most cloud providers expose APIs that are typically well-documented but also unique to their implementation and thus not interoperable. Some vendors have adopted others' APIs and there are a number of open standards under development, with a view to delivering interoperability and portability.[2]

#### 9. Business service platform

Commerce Services Platform enables service providers and software companies to become solution providers, as this is a hybrid of SaaS and MSP. They're most common in trading environments, such as expense management systems, that allow users to order travel or secretarial services from a common platform that then coordinates the service delivery and pricing within the specification set by the user [5].

#### 10. Internet Integration

The integration of cloud-based services is in its early days. OpSource, which mainly concerns itself with serving as SaaS providers, recently introduced the OpSource Services Bus, which employs in-the-cloud integration technology from a little startup called Boomi.

SaaS provider Workday recently acquired another player in this space, CapeClear, an ESB (enterprise service bus) provider that was edging toward b-to-b integration [12].

## 11. Security Issues

Physical control of the Private Cloud equipment is more secure than having the equipment off site and under someone else's control. Physical control and the ability to visually inspect data links and access ports is required in order to ensure data links are not compromised. Issues barring the adoption of cloud computing are due in large part to the private and public sectors' unease surrounding the external management of security-based services. It is the very nature of cloud computing-based services, private or public, that promote external management of provided services. This delivers great incentive to cloud computing service providers to prioritize building and maintaining strong management of secure services. Security issues have been categorized into sensitive data access, data segregation, privacy, bug exploitation, recovery, accountability, malicious insiders, management console security, account control, and multi-tenancy issues. Solutions to various cloud security issues vary, from cryptography, particularly public key infrastructure (PKI), to use of multiple cloud providers, standardization of APIs, and improving virtual machine support and legal support. To mitigate the threat, cloud computing stakeholders should invest heavily in risk assessment to ensure that the system encrypts to protect data, establishes trusted foundation to secure the platform and infrastructure, and builds higher assurance into auditing to strengthen compliance. Security concerns must be addressed to maintain trust in cloud computing technology [9].

## 12. Types Of Cloud Computing

### 12.1 Private

This is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted internally or externally. Undertaking a private cloud project requires a significant level and degree of engagement to virtualize the business environment, and requires the organization to reevaluate decisions about existing resources. When done right, it can improve business, but every step in the project raises security issues that must be addressed to prevent serious vulnerabilities [13].

### 12.2. Public

A cloud is called a "public cloud" when the services are rendered over a network that is open for public use. Technically there may be little or no difference between public and private cloud architecture, however, security consideration may be substantially different for services (applications, storage, and other resources) that are made available by a service provider for a public audience and when communication is effected over a non-trusted network. Generally, public cloud service

providers like Amazon AWS, Microsoft and Google own and operate the infrastructure and offer access only via Internet (direct connectivity is not offered).[13].

### 12.3. Community

Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally.

### 12.4 . Hybrid

Hybrid cloud is a composition of two or more clouds (private, community or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models. For example, an organization may store sensitive client data in house on a private cloud application, but interconnect that application to a billing application provided on a public cloud as a software service. This example of hybrid cloud extends the capabilities of the enterprise to deliver a specific business service through the addition of externally available public cloud services [13].

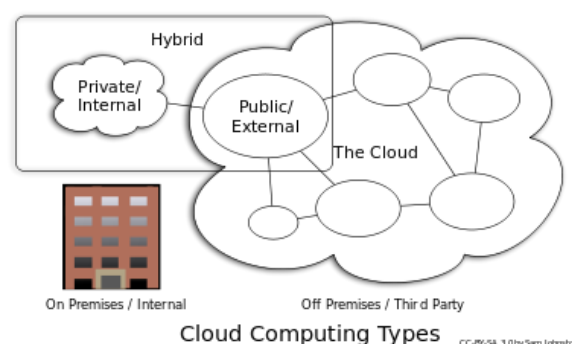


Figure: 2. Types of cloud computing

## 13. Outsourcing cloud computing

Companies have varying reasons for considering outsourcing cloud computing. For some, cloud computing is only an occasional need and so not worth investing in an internal group. For others, cloud computing is an ongoing requirement, but the skills required seem so different from the ones currently available in the company that building this expertise from scratch would be very challenging. Still others have their customer data hosted by an outside vendor and feel that the analysis should take place close to the data. Some companies think they have little need for building models and using data to understand customers. These companies generally fall into one two types. The first are the companies with few customers, either because the company is small or because each customer is very large. As an example, the private banking group at a typical bank may serve a few thousand customers, and the account representatives personally know their clients. In such an environment, cloud computing may be superfluous, because people are so intimately involved in the relationship.[4]. However, computing

can play a role even in this environment. In particular, cloud computing can make it possible to understand best practices and to spread them. For instance, some employees in the private bank may do better job in some way (retaining customers, encouraging customers to recommend friends, family members, colleagues, and so on). These employees may have best practices that should be spread through the organization. Cloud computing may also seem unimportant to rapidly growing companies in a new market. In this situation, customer acquisition drives the business, and advertising, rather than direct marketing, is the principal way of attracting new customers. Applications for cloud computing in advertising are limited, and, at this state in their development, companies are not yet focused on customer relationship management and customer retention. For the limited direct marketing they do, outsourced modeling is often sufficient [4]. Wireless communications, cable television, and internet service providers all through periods of exponential growth that have only recently come to an end as these markets matured (and before them, wired telephones, life insurance, catalogs, and credit cards went through similar cycles). During the initial growth phases, understanding customers may not be a worthwhile investment-an additional cell tower, switch or whatever may provide better return, eventually, though, the business and the customer base grow to a point where understanding the customers takes on increased importance. In our experience, it is better for companies to start early along the path of customer insight, rather than waiting until the need becomes critical. Open-source software has provided the foundation for many cloud computing implementations, prominent examples being the Hadoop framework and VMware's Cloud Foundry. In November 2007, the Free Software Foundation released the Affero General Public License, a version of GPLv3 intended to close a perceived legal loophole associated with free software designed to run over a network. Most cloud providers expose APIs that are typically well-documented (often under a Creative Commons license) but also unique to their implementation and thus not interoperable. Some vendors have adopted others' APIs and there are a number of open standards under development, with a view to delivering interoperability and portability. As of November 2012, the Open Standard with broadest industry support is probably OpenStack, founded in 2010 by NASA and Rackspace, and now governed by the OpenStack Foundation. OpenStack supporters include AMD, Intel, Canonical, SUSE Linux, Red Hat, Cisco, Dell, HP, IBM, Yahoo and now VMware[4].

#### 14. Cloud computing infrastructure

#### 16. Acknowledgement

We would like to thank all my co-authors for their valuable contribution.

#### 17. References

In companies where cloud computing is merely an exploratory activity, Useful cloud computing can be accomplished with little infrastructure. A desktop workstation with some cloud computing software and access to the corporate databases is likely to be sufficient. However, when cloud computing is central to the business, the cloud computing infrastructure must be considerably more robust. In these companies updating customer profiles with new model scores either on a regular schedule such as once a month or, in some cases with each new transaction, is part of the regular production process of the data warehouse. The cloud computing infrastructure must provide a bridge between the exploratory world where models are developed and the production world where models are scored and marketing campaigns run [2]. A production ready cloud computing environment must be able to support the following:

1. The ability to access data from many sources and bring the data together as customer signatures in a cloud computing model set.
2. The ability to score customers using already created models from the model library on demand.
3. The ability to manage hundreds of model scores over time.
4. The ability to manage scores of hundreds of models developed over time.
5. The ability to reconstruct a customer signature for any point in a customer's tenure, such as immediately before a purchase or other interesting event.
6. The ability to track changes in model scores over time.
7. The ability to publish scores, rules, and other computing results back to the data warehouse and to other applications that need them.

The cloud computing infrastructure is logically (and often physically) split into two pieces supporting two quite different activities: computing and sharing. Each task presents a different set of requirements.

#### 15. Conclusion

In future, for the security purposes, the large enterprises can be building their own private clouds and the cloud computing service providers will support information security as well. The enterprises will become part time cloud-computing vendors and you need only the browser as a development tool. Game Servers will be the most interesting cloud computing in future.

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