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# Cloud Computing: Migration from Traditional Systems to the Cloud

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***Abstract*- Over the past few decades Business organizations have tried hard to keep up with the changes encountered in the market. Various factors like increased load, security, availability, fail safe mechanisms etc. have to be taken care of by these organizations and the traditional approaches are turning out to be cumbersome as well as expensive. Various computing paradigms have been employed for this purpose and tested to meet these demands. In this paper, we present how Cloud Computing fares in meeting these requirements, how it can be used as a solution for various systems and the various advantages of migrating your system to the Cloud.**

***Keywords- Cloud Computing, High Performance Computing, Hosting on the Cloud, Migration to the Cloud***

## 1. INTRODUCTION

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. It is evolving as a key computer platform for sharing resources that include infrastructures, software, applications, and business processes. Virtualization is a core technology for enabling cloud resource sharing [5].

Everyone has a different perception of Cloud Computing. It can be the ability to rent a server or a thousand servers and run a geophysical modelling application on the most powerful systems available anywhere [8].

Cloud computing [1][3] is an emerging trend to deploy and maintain software and is being adopted by the industry such as Google, IBM, Microsoft, and Amazon.

In a cloud computing system, there's a significant workload shift. Local computers no longer have to do all the heavy lifting when it comes to running applications. The network of computers that make up the cloud handles them instead. Hardware and software demands on the user's side decrease. The only thing the user's computer needs to be able to run is the cloud computing systems' interface software, which can be as simple as a Web browser, and the cloud's network takes care of the rest.

Cloud offerings can vary from virtual infrastructure, computing platforms, centralized data centres to end-user Web-Services and Web applications to enormous other focused computing services. Cloud Computing may be applied to solve problems in many domains of Information Technology like GIS (Geographical Information Systems), Scientific Research [2], e-Governance Systems [4], Decision Support Systems [9], ERP [3], Web Application Development [6], Mobile Technology [7] etc.

This paper briefly discusses the application of Cloud Computing and the several benefits of hosting a system on the cloud. It also discusses the various issues faced while migrating from a traditional system to a system hosted on the cloud.

## 2. CLOUD COMPUTING: BRIEF DESCRIPTION

According to NIST, National Institute of Standards and Technology:

"Cloud Computing is a model for enabling 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."

A cloud service has three distinct characteristics that differentiate it from traditional hosting.

- It is sold on demand, typically by the minute or the hour;
- It is elastic -- a user can have as much or as little of a service as they want at any given time
- The service is fully managed by the provider (the consumer needs nothing but a personal computer and Internet access).

Cloud computing systems need at least twice the number of storage devices it requires to keep all its clients' information stored. That's because these

devices, like all computers, occasionally break down. A cloud computing system must make a copy of all its clients' information and store it on other devices. The copies enable the central server to access backup machines to retrieve data that otherwise would be unreachable. Making copies of data as a backup is called **redundancy**.

### 2.1 CLOUD COMPUTING: SERVICE MODEL

The services offered within Cloud Computing are broadly divided into 3 major categories.

#### 2.1.1 Software as a Service (SaaS)

Software as a Service (SaaS) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet. With SaaS, a provider licenses an application to customers either as a service on demand, through a subscription, in a "pay-as-you-go" model, or (increasingly) at no charge. This approach to application delivery is part of the utility computing model where all of the technology is in the "cloud" accessed over the Internet as a service. Benefits of the SaaS model include easier administration, automatic updates, compatibility as all users will have the same version of the software, easier collaboration for the same reason and global accessibility.

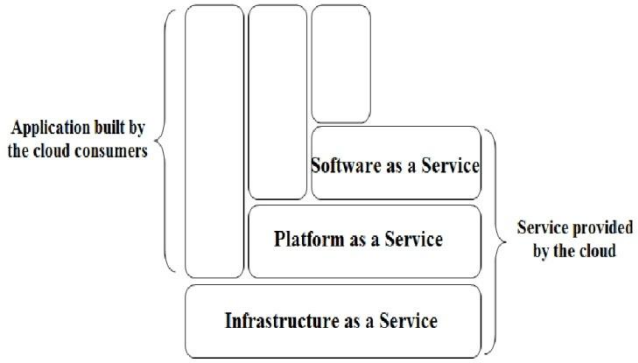
The most commonly referenced examples of SaaS is Salesforce.com‘s human-resource applications, which provides a customer relationship management (CRM) system accessible via the Internet Google Apps, Microsoft Office Live, Cisco WebEx ,Oracle CRM etc.

#### 2.1.2 Platform as a Service (PaaS)

Platform as a Service (PaaS) is an outgrowth of Software as a Service (SaaS), a software distribution model in which hosted software applications are made available to customers over the Internet. It is a way to rent hardware, operating systems, storage and network capacity over the Internet. The service delivery model allows the customer to rent virtualized servers and associated services for running existing applications or developing and testing new ones. PaaS offerings may include facilities for application design, application development, testing, deployment and hosting as well major advantage of using the private cloud services is that it presents the provider and the user greater control of the cloud infrastructure, improving security and adjustability because user access and the networks used are constrained and selected. This model gives organizations a high level of control as application services such as team collaboration, web service integration and marshalling, database integration, security, scalability, storage, persistence, state management, application versioning, application instrumentation and developer community facilitation. It facilitates the deployment of customer-created applications to the cloud using provider-supported frameworks, including APIs based on Java, Python, or .Net.

#### 2.1.3 Infrastructure as a Service (IaaS)

Infrastructure as a Service is a provision model in which an organization outsources the equipment used to support operations, including storage, hardware, servers and networking components. The service provider owns the equipment and is responsible for housing, running and maintaining it. The client typically pays on a per-use basis. The client typically pays on a per-use basis (Amazon Elastic Compute Cloud or Amazon Simple Storage Service e.g.).




### 2.2 CLOUD COMPUTING: TYPES

In addition to service levels, cloud computing is also classified into deployment models, each with its own strengths and applications depending on customer and corporate requirements.

#### 2.2.1 Private Cloud

A private cloud is a proprietary network or a data centre that supplies hosted services to a limited number of people. The data and processes in the case of Private Cloud are administered inside the organization by an IT department within an organization, without the limitations of network bandwidth, security exposures and legal requirements that using public cloud services might involve. One over the use of cloud resources while bringing in the expertise needed to establish and operate the environment [8].

#### 2.2.2 Community Cloud

The cloud infrastructure is shared by several

organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on-premise or off-premise. Non-profit, social networking and affiliated groups often use community cloud infrastructures to leverage the one-size-fits-all templates for security, storage allocations, and other infrastructure components.

#### 2.2.3 Public Cloud

The public cloud is merely any cloud computing platform open for use to the public whether it is individuals or large corporations. It sells services to anyone on the Internet. (Currently, Amazon Web Services is the largest public cloud provider.)Public clouds, however, ensure that individual cloud users are offered ample security and privacy. Public clouds are most often hosted away from customer premises, and they provide a way to reduce customer risk and cost by providing a flexible, even temporary extension to enterprise infrastructure [8].

#### 2.2.4 Hybrid Cloud

The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds). Corporations often host their public-facing Website and eCommerce front ends on public cloud infrastructures, while they reserve private clouds for data storage and internal and intranet computing services. The public portion of the cloud accommodates bursts in traffic, while the private side of the cloud serves sustainable and stable applications and business functions.

## 3. MIGRATING TO THE CLOUD

Once a company has decided to implement a Cloud infrastructure, it has to make another major decision. This decision is the path to be implemented for the migration. For this decision to be made various considerations have to be taken into account such as:

- Size and complexity of current applications
- Amount and number of applications
- Whether the current platform is due for updates or replacements

The following methods are the most common methods of migration used by organizations worldwide.

### 3.1 Incremental Cloud Deployment

Most companies start out incrementally, choosing a SaaS or IaaS application that would replace an in-house application, such as CRM, Sales force automation, or email. After this application is run successfully then new components are then hosted on the cloud. The company generally documents the migration of each system and application in order to determine the difference in the cost and the performance and observe if the changes are fruitful for the organization.

### 3.2 Legacy Migration

Migration to the Cloud isn't an easy task. Thus for a large organization it is imperative that businesses with a large base of legacy computing applications have a competent and experienced cloud computing provider to help them reengineer their systems for optimum performance and reliability.
Productivity, customer satisfaction, and business continuity cannot suffer during a migration. Companies should create mirror systems of key legacy applications — one on the new cloud platform, another on the existing platform, and compare performance, reliability, functionality before cutting over to the cloud-based version. Also, companies should consider moving the most critical legacy applications last.

### 3.3 Avoiding Costly Upgrades

When businesses are faced with costly and complex upgrades to applications the Cloud computing alternatives should be considered. Instead of procuring new software as well as hardware for storage a company can upload existing data from their legacy applications on the cloud and test the applications on live data and retire the legacy application once the platform is fully tested. This is one of the most common reasons for migration these days.

### 3.4 Straight to the Cloud

Customers with relatively simple legacy applications, such as business productivity software and a few custom applications are better off making a complete changeover. The cloud infrastructure and applications can be configured, tested, and rolled out in tandem with old systems, and cut over can occur fairly quickly.

## 4. THE CLOUD ADVANTAGE

Hosting a system on the Cloud has various advantages. Most of the Information Support Systems usually deal with large volume of data (structured and unstructured) that requires huge CPU power to produce results in reasonable time on which wide range of users are dependent which may be located

over a large geographical area. However, configuring and maintaining a cluster or a computational grid is usually a very cumbersome activity that requires specialists to support it. In addition, the high cost to acquire this computational apparatus can be considered a serious problem to the effective use of the ISS in terms of timeliness service and availability. Businesses can also save on power costs as they reduce the number of servers required. And with IT staff spending less time managing and monitoring the data centre, IT teams are well placed to further streamline their operations as staff complete more work on fewer machines.

The major advantages of hosting a system on the cloud include:

### 4.1 On Demand Scalability

The ability of Cloud Computing solutions to scale up and down is a major advantage. If a system has varied loads at different points of time the system will be able to cater those changes. Using the Cloud a threshold value can be set for putting up another server to balance the load on the system. This enables the efficient running of the application.

### 4.2 Streamlining the Data Centre

With no more worries regarding storage, hosting on the cloud has saved a lot of resources for organizations. [10]

### 4.3 Cost Efficient

Traditional desktop software cost companies a lot in terms of finance. Add to that the licensing fees for enabling the use of that software by multiple users can prove to be very expensive for the organization. The Cloud is available at cheaper rates and also includes various 'pay as per usage' options for reducing the expenses by a great margin.

### 4.4 Backup and Recovery

This is one of the biggest advantages of hosting on the cloud. Since most of the data is hosted on the Cloud, backup is made much easier as compared to storing the same on physical device. Moreover, cloud service providers are competent enough to handle recovery of information.

## 5. CONCLUSION

In this paper we discussed Cloud Computing in general and how it helps in improving the running of an application. We also have discussed the strategies that could be implemented for the migration a traditional system that's currently hosted on physical servers within the organization or otherwise to a system hosted on the Cloud. The various advantages and challenges associated with the same have also been presented. Cloud Computing is still taking its baby steps but it promises to be the future of the IT sector. Although it has its numerous advantages, like anything in this world it does have its disadvantages too. But, as long as the pros overcome the cons for an organization this platform should be carefully considered while facing issues like those mentioned above.

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