Investigating the Evolution of Cloud Computing: Research Perspectives

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Abstract - Cloud computing is an economical and powerful tool for small businesses, especially in developing countries. It offers a scalable solution for enterprise resource planning, supply chain management, customer relationship management, healthcare applications, and mobile apps that can reach many users. In this paper, we examine the various concepts associated with cloud computing. Leveraging our experience with different clouds, we explore clouds from technical and business perspectives. We highlight some of the opportunities in cloud computing, emphasizing the importance of cloud technology. This paper provides detailed information about the features, uses, and practical applications of cloud computing.

Keywords - Cloud computing, use cases, characteristics

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INTRODUCTION

The following discusses cloud computing, including various service models such as software, infrastructure, and Platform as a service. Additionally, it covers deployment models such as private, public, community, and hybrid clouds. The benefits and challenges associated with cloud computing are also outlined.

The term "cloud" refers to the Internet and its various components represented as schematic clouds. Cloud computing involves migrating applications and services to the Internet's "cloud." Although cloud computing has been around in some form for a while, it now refers to various services and applications being offered in the Internet's cloud. The tools used to access these services and applications often do not require any special software.

Several companies offer cloud services, including Google, Microsoft, and Salesforce.com. Google provides a private cloud for its users, including Google Docs, email, analytics, and more. Microsoft offers Microsoft Office 365, which allows data and business intelligence to be transferred to the cloud. Salesforce.com offers cloud services for developers to create customized cloud solutions.

This text covers the characteristics, service models, deployment models, benefits, and challenges of cloud computing.

History
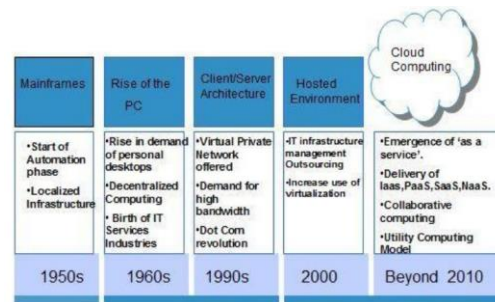
Cloud Computing is a concept that originated in the 1950s with the advent of centralized processing unit desktop computers that were accessed using thin/static clients. Since then, it has evolved from fixed clients to dynamic ones and from software to services. Cloud Computing has many benefits. Some of them are:

- Access to applications as utilities over the Internet

- Ability to run and install the application online anytime

- No need to download a specific part of the software to access or manage the cloud application

- Online development and deployment tools provided through Platform as a Service model

- Cloud resources are available over the network, giving the user access to any client

- On-demand service that can be used without interacting with the cloud service provider

- Cost-effective due to better efficiencies and higher usage. It only requires an Internet connection

- Cloud Computing uses many redundancies, making it more reliable.
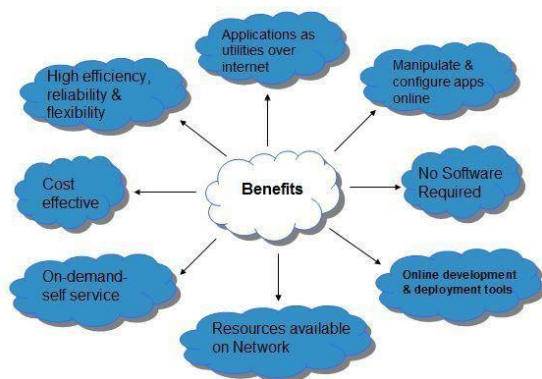
MAIN CHARACTERISTICS OF CLOUD COMPUTING

Cloud computing is a virtualized software platform that allows sharing of resources such as physical infrastructure, storage, and media capabilities. It aims to utilize the available commercial infrastructure across multiple clients. The Platform also has dynamic provisioning capabilities that enable services to be provided based on current demand requirements. This is done through program automation, which allows for developing and maintaining service capacity as needed. The dynamic scaling is executed while maintaining high levels of reliability and security.

Cloud computing should be accessible through the internet from various devices such as laptops, computers, and mobile phones, using standards-based APIs such as HTTP. Services provided by the cloud can range from fulfilling service requests to the latest applications used on modern devices.

Managed metering is used to manage, utilize and provide billing information. This ensures that

customers are charged for their services during the billing period.

In summary, cloud computing allows for the sharing and scalable deployment of services as required from anywhere, and customers are charged based on actual usage.

A cloud computing environment has five key features, including universal access, scalable services, on-demand services, pay-per-use billing, and collaboration. It also offers reliability, customization, defined services, control, and virtualization.

SOME EXAMPLES OF CLOUD SERVICE PROVIDERS

Google.com has become synonymous with the word "search," and people often say, "Just Google it, and you'll find everything." However, Google offers more than just search services. It also provides cloud solutions such as G-mail, Google Docs, Picasa, Google Analytics, Google AdWords and AdSense.

Microsoft has its own Platform for delivering cloud services to customers and application developers. The services run in Microsoft's data center, including Microsoft Azure, SQL Azure, Windows Azure App Fabric, and Windows Azure Marketplace.

Amazon Web Services offers a cloud computing platform for businesses of all sizes. AWS allows businesses to choose their own computing platform according to their needs and pay only for what they use. The services offered by AWS include Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Virtual Private Cloud, Amazon CloudFront, Amazon Relational Database, and Amazon Simple Queue Service.

APPLICATIONS OF CLOUD COMPUTING

Cloud computing is one of the most popular computing resources available on the internet. It simplifies the management and sharing of resources through the cloud. This technology has become an active component in several industries, including:

1. E-Learning provides a conducive learning environment for students, teachers, and professionals. They can easily connect to their organization's cloud and access information and data from there.

2. Enterprise Resource Planning (ERP): Companies can install ERP in the cloud to handle operations, staff, payroll, and other tasks that are typically complex and expensive to manage.

3. E-Governance: Cloud computing can help governments improve their efficiency by providing better services to citizens, businesses, and other governments. This can be achieved by expanding access to the system, making it more scalable, and

customizing it to meet specific needs. It also reduces the complexity of managing, spending, and upgrading infrastructure.

Table 1: Different applications of cloud computing.

Application	Services provided
E-learning	E-mail, simulation tools, files broadcasting, class recording, virtual classrooms, virtual labs, surveys, education forums
ERP Cloud	Supply chain and vendor, project and HR Management, customer Relationship management, finance and accounting
E-governance	Complaint resolution system, employee management system, E-police, E-court, payment and tax system, agriculture and food, industry and energy

CLOUD USE CASES

We conduct an examination of group requirement usage situations to understand how technology is used and draw best practices. This analysis helps define requirements, provide input for classification, and verify architecture. It also helps identify key stakeholders.

When it comes to moving a company's IT resources to the cloud, the right cloud provider and deployment model are determined by several factors, such as business needs and requirements. Besides technical considerations, other factors, such as business, company, or personnel elements, must also be taken into account. Some older systems may need to be redesigned, and the transition period from internal to cloud services must be fully considered.

Different methods exist to develop usage scenarios, such as looking at various business models and deployment models, describing possibilities based on stakeholder involvement and company relationships, or acquiring and taking open market or community use cases. A collaborative effort of Cloud Computing experts has considered one approach to defining instance use cases:

- Final user to Cloud

- Business to Cloud to Final user

- Company to Cloud

- Company to Cloud to Endeavor Private Cloud

- Changing Cloud Providers

- Integration Cloud

It is important to note that these scenarios are developed based on a specific effort required. For example, a company may want to move part of its IT system to the Cloud to gain Cloud benefits such as switching from CAPEX to OPEX IT costs and improving service speed.

The process of moving to the Cloud only happens in one go. For larger companies, it usually begins with implementing a private cloud and moving local IT services to cloud-based ones. This leads to the readiness of the whole IT department and its preparedness to outsource some services to the public cloud, creating a hybrid cloud. The next step is to move functional IT areas or some branches entirely to the cloud. We will examine the challenges and how to solve them in the following usage scenarios.

Some general cloud use cases include:

- A moving part of the job to the cloud in case of sudden demand increase (sometimes called "cloudburst").

- Disaster recovery by moving/restoring critical case loads in a friend cloud or fixing a private cloud-based IT platform

THE CLOUD COMPUTING PARADIGM

The following discusses computer requirements that share a common feature of utilizing cloud computing but differ in certain aspects that affect their costs. The concept of cloud computing has been in the spotlight recently, with debates about its safety and reliability. There needs to be more clarity about cloud computing and how it compares to traditional computing. At OpenWorld 2008, Larry Ellison, CEO of Corp., redefined cloud computing to include all aspects of computing, causing a split in the industry. Some believed he was right, while others disagreed. Ellison argued that cloud computing wasn't a trend but a concept that had been around for years. In September 2012, Ellison launched an Infrastructure-as-a-Service (IaaS) cloud service, proving his point. However, many vague descriptions of cloud computing still need to be clarified for people. The National Institute of Standards and Technology defines cloud computing as a model allowing on-demand access to a shared pool of configurable computing resources. The key difference between cloud computing and traditional computing lies in the ability to quickly and easily scale up or down resources, deploy and monitor applications, and ensure high levels of reliability. While there is some overlap between cloud computing and other forms of computing, the differences are significant.

CONCLUSION

Our experts have found that while Cloud Computing may seem uncertain to customers, there is a clear difference when viewed from a business perspective, especially when compared to its predecessor, Utility Computing. The main objective of cloud computing is to reduce or eliminate challenges associated with normal application development, maximize business IT systems to focus on business strategy, and determine how to best utilize cloud-based IT to support that strategy. This paper provides a detailed

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explanation of the characteristics, uses, and specific examples of cloud computing.

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