



ORIGINAL RESEARCH PAPER

Computer Science

TODAY'S USER TRENDS IN HYBRID CLOUD COMPUTING

KEY WORDS: Cloud Computing, Architecture, Public Cloud, Private Cloud, Hybrid Cloud

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ABSTRACT

This paper describes the concepts of today's user trends, their challenges of cloud computing, and its architecture. Computing is a model for enabling universal, on-demand and convenient network access to a shared pool of configurable computing resources like networks, servers, storage, applications, and their services. Paper also represents the various stages that cloud architecture has gone through to be what it is today and with that reference, paper successfully depicts the future predictions of cloud computing architecture and its trends. The cloud resources are shared using infrastructure provided by a cloud service provider.

1. INTRODUCTION

Cloud computing the word cloud (also phrased as "the cloud") is used as a metaphor for "the Internet," so the phrase cloud computing means "a type of Internet-based computing," where different services such as networks infrastructure, on demand servers, remote storage and their applications are delivered to an organization's computers and devices through the Internet.

In cloud computing technique and with the fast development of the internet the resources have become more powerful, cheaper and more available. This development produced a new computing model called cloud computing. In this resources are provided by On-Demand approach. It is the on-demand information technology service. It is based on dynamically virtualized resources.

Cloud computing has evolved to emerge the most topical IT paradigm in recent times. Cloud computing is rapidly transforming the IT landscape. On a pay-as-you-use basis, cloud consumers can access resources, applications and infrastructure provided by cloud providers. Such access could be in form of applications already deployed by cloud providers for use by the cloud users. It could be in form of the capability to develop and deploy user applications using services of a cloud provider. Also, massive storage infrastructure is available for database and data supplied by the user. The cloud has several unique architectures and many more are still evolving. The primary ones are the SaaS, PaaS and the IaaS that can be deployed on private, public, community and hybrid clouds. This paper examines present developments in the cloud computing architecture and also presents guidance for additional research. Papers published in journals, conferences, white papers were analyzed. The objective of this present work is to identify, examine and explain the current trends and development in cloud computing architecture. However, only 22% of the papers examined discussed Others-as-a-Service, while only 37% of the papers reviewed considered issues relating to the major actors involved in cloud computing. This will be beneficial to cloud providers, users, and researchers alike

According to NIST, five major users have been identified in cloud computing. The NIST Model shows the users which are discussed below.

Cloud Consumer: A person or organization that starts and keeps a business association with and requires services from suppliers of cloud services.

Cloud Provider: A person, organization engaged in supplying cloud computing services to interested persons or organizations.

Cloud Auditor: An organization in charge of conducting independent evaluation of cloud computing, and determining the systems effectiveness and security.

Cloud Broker: A third-party organization or individual that serves as an intermediary between cloud consumers and cloud providers. He/she is useful for negotiating terms and conditions of the contract for the purchase of cloud services.

Cloud Carrier: An intermediary person, organization or entity that provides connectivity and transport of cloud services from cloud provider to cloud consumers.

2. Characteristics Cloud Computing

- On-demand self-service: Computing capabilities are allocated to users based on their predefined requirements. Capabilities such as server processing time and storage spaces are allocated automatically without human interference.
- Broad Network Access: Thick or thin clients (ranging from tablets, laptops, workstations to mobile phones) enjoy access to the cloud by using standard mechanisms.
- Resource pooling: Multi-tenant models pool together resources in order to provide services to multiple consumers. These services can be customized to satisfy the peculiarity of each consumer's requirements.
- Rapid Elasticity: This describes the cloud providers' ability to rapidly deploy scalable resources at the request of consumers. The cloud architecture must be able to seamlessly scale up and down amongst each requests of users, ensuring that the capabilities appear unlimited to the consumer.
- Measured Service: The cloud provider monitors and controls certain aspects of the cloud service to ensure effective resource usage and overall predictive planning. This is achieved by the use of a metering capability embedded within the system.

3. Basic Services of Cloud Computing

Today's Cloud architecture can be divided into the back end and front end. The front end is made visible to the user through connections to the Internet, allowing user interactions with the system. The back end comprises the various cloud services models.

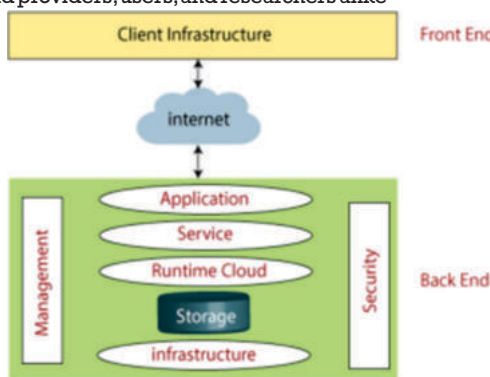


Fig-1: Cloud Computing Infrastructure

3.1. Software-as-a-Service (SaaS)

The user is offered a hosted set of software running on a platform and infrastructure owned by the cloud provider. Applications are designed and developed to be simultaneously accessed by various cloud consumers over the Internet. The hosted application is managed by the CSP, who maintains and ensures up-to-date running of the system. The hosted application supports multi tenancy, it is available on demand and can be scaled up on down. Some SaaS providers run on other cloud provider's PaaS or IaaS offerings.

Examples of SaaS:

- Email and Office Productivity: Email applications, word editors and processors, spreadsheets applications, presentations applications are typical examples in this category.
- Billing: There are applications designed to monitor and manage customer billing. This is determined by users' system usage and subscriptions to products and services.
- Customer Relationship Management (CRM): CRM are typical call-centre applications.
- Financials: These are applications useful for tracking and reporting financial activities including processing of expenditure, generating invoices, payroll, and managing taxes.

3.2. Platform-as-a-Service (PaaS)

PaaS is a development service offered to the user through the Internet. The user does not require any software installation or hardware requirements, thereby saving cost. It is a middleware upon which applications are built. PaaS has built-in tools, built-in security and web service interfaces for the deployed applications. The deployed application can be integrated with other applications on the same platform and interfaced with other applications outside the platform. PaaS has software comprising a database, middleware and development tools.

Examples of PaaS:

- Business Intelligence.
- Database.
- Development and Testing.
- Integration.
- Application Deployment.

3.3. Infrastructure-as-a-Service (IaaS)

This is delivery of servers, storage, network and operating system, as a service. IaaS provides an abstract machine with operating system already installed and configured. IaaS enables data to be stored in different geographical locations. IaaS providers control activities in the cloud data centres while allowing users the flexibility to deploy and manage software services themselves. The user has access to a virtual computer, storage, network infrastructure, computing resources for deploying and running software. The cloud provider only manages the software and hardware, such as servers, storage devices, host OS and hypervisor for virtualization. A typical cloud architecture diagram services available to cloud users.

Examples of IaaS:

- Content Delivery Networks (CDNs): CDNs record user content and files to improve the system performance such as speed and the cost associated with the delivery content for web-based systems. This is useful for handling diverse kinds of content for delivery to any website or mobile app.

4. Recent Cloud Types

An organization can use one of four different types of clouds.

1. Public cloud
2. Private cloud
3. Hybrid cloud
4. Community cloud

4.1. Public Cloud: Amazon and Google, for example, are well-known for their public clouds. This cloud is noted for having a lot of storage space. A public cloud is generally used by business teams for collaborative projects or software development. Many platforms will also allow customers to pay for more capacity as needed, allowing for scalability.

4.2. Private Cloud: Private clouds, like public cloud storage, allow users to access, use, and cache data on the cloud from anywhere. Private cloud infrastructure, on the other hand, is frequently protected by a firewall, which is a network security device that monitors and restricts network traffic. This means that only those who have been given permission to use these computing resources can do so. Private clouds will be preferred by companies with stringent regulatory criteria to protect their information and data.

4.3. Hybrid Cloud: Hybrid clouds combine the benefits of both public and private clouds. They're designed to let consumers use and save data on both platforms at the same time.

4.4. Community Cloud: A private cloud that functions similarly to a public cloud is referred to as a community cloud. They are collaborative in nature, allowing different authorized companies to exchange and collaborate on the same applications. Community clouds are typically used by firms who are in the same industry but have similar security or regulatory concerns. Community clouds are commonly used by healthcare providers and government institutions.



Fig-2: Cloud Community and Types

A community cloud is a multi-tenant cloud service model that is shared among several or organizations and that is governed, managed and secured commonly by all the participating organizations or a third party managed service provider. Community clouds are a hybrid form of private clouds built and operated specifically for a targeted group. These communities have similar cloud requirements and their ultimate goal is to work together to achieve their business objectives

5. Issues in Cloud Designing and Services Access

In this level of research, the key issues in creating an open architecture and in the development of heterogeneous platforms have been discussed.

5.1. Architectural Issues

It is essential to construct a cloud computing architecture with the important features such as unification, scalability and reusability. But the development of such architecture may face additional challenges because of the emerging technologies and industry practices.

5.2. Platform Related Issues

Numerous platforms have emerged as an outcome of the increased demand in cloud computing. Some literatures have addressed issues related to heterogeneous platforms.

Though a number of cloud platforms are available, each one provides its own interface for customers to interact with underlying infrastructures. But it becomes a great challenge for one cloud user to access the services when remotely interacting with other clouds, because of heterogeneous software and incompatible Interfaces.

5.3. Security Threat in the Cloud

Another disadvantage of using cloud computing services is the security risk. You should be aware that if you use cloud computing, you will be sharing all of your company's sensitive data with a third-party cloud computing service provider. This information could be accessed by hackers. When working with cloud computing, it's also important to factor in downtime. This is due to the fact that your cloud provider may have power outages, poor internet access, and service maintenance, among other things. Internet Connectivity: In cloud computing, reliable Internet access is essential. You can't use the cloud if you don't have access to the internet. Furthermore, there is no other means to collect data from the cloud. Lower Bandwidth: Many cloud storage companies restrict their users' bandwidth use. As a result, if your company exceeds the allotted budget, the extra costs could be enormous. Lacks of Support: Customers are not properly supported by cloud computing firms.

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