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Cloud Computing

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Abstract: *The cloud computing is a new computing model which comes from grid computing, distributed computing, parallel computing, virtualization technology, utility computing and other computer technologies and it has more advantage characters such as large scale computation and data storage, virtualization, high expansibility, high reliability and low price service. The security problem of cloud computing is very important and it can prevent the rapid development of cloud computing. This paper introduces some cloud computing systems and analyzes cloud computing security problem and its strategy according to the cloud computing concepts and characters. The data privacy and service availability in cloud computing are the key security problem. Single security method cannot solve the cloud computing security problem and many traditional and new technologies and strategies must be used together for protecting the total cloud computing system.*

Keywords: Cloud Computing

I. INTRODUCTION

The impact of cloud computing on industry and end users would be difficult to overstate: many aspects of everyday life have been transformed by the omnipresence of software that runs on cloud networks. By leveraging cloud computing, startups and businesses are able to optimize costs and increase their offerings without purchasing and managing all the hardware and software. Independent developers are empowered to launch globally-available apps and online services. Researchers can share and analyze data at scales once reserved only for highly-funded projects. And internet users can quickly access software and storage to create, share, and store digital media in quantities that extend far beyond the computing capacity of their personal devices. Despite the growing presence of cloud computing, its details remain obscure to many. What exactly is the cloud, how does one use it, and what are its benefits for businesses, developers, researchers, government, healthcare practitioners, and students? In this conceptual article, we'll provide a general overview of cloud computing, its history, delivery models, offerings, and risks. By the end of this article, you should have an understanding of how the cloud can help support business, research, education, and community infrastructure and how to get started using the cloud for your own projects.

II. SCOPE OF CLOUD COMPUTING

The scope of cloud computing is very bright. According to a report, the cloud computing market in India is at $2 billion and is expected to grow with an annual growth rate of 30%. By 2020, the cloud computing market in India is supposed to reach $4 billion and create more than a million jobs in this country.

Roles specific to this domain, such as Cloud Infrastructure Engineer, Cloud Architect, Cloud Enterprise Architect, and Cloud Software Engineer, are in massive demand according to a report.

III. HOW DOES CLOUD COMPUTING WORK

Cloud computing is an application-based software infrastructure that stores data on remote serves, which can be accessed through the internet. To understand how cloud computing works, it can be divided into front-end and backend. The front end enables a user to access data stored in the cloud using an internet browser or a cloud computing software. However, the primary component of cloud computing – responsible for securely storing data and information – is the backend. It comprises servers, computers, databases, and central servers. The central server facilitates operations by following a set of rules known as protocols. It uses a software, middleware, to ensure seamless connectivity between devices/computers linked via cloud computing. Cloud computing service providers usually maintain multiple copies of the data to mitigate instances of security threats, data loss, data breach, etc.

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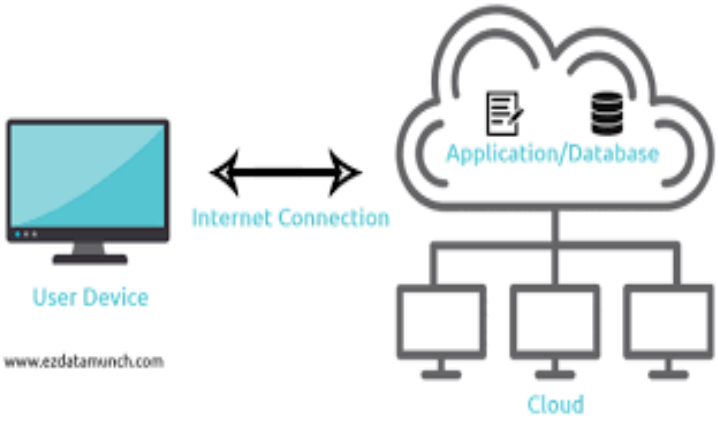


HCL has a plethora of services, from cloud consulting and assessment to cloud management and operations, that enable organizations on their road to cloud adoption.

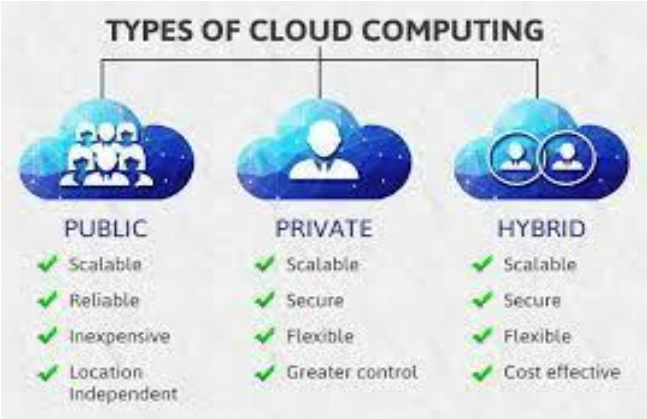
IV. TYPES OF CLOUD COMPUTING

4.1 Public Clouds

Public clouds are cloud environments typically created from IT infrastructure not owned by the end user. Some of the largest public cloud providers include Alibaba Cloud, Amazon Web Services (AWS), Google Cloud, IBM Cloud, and Microsoft Azure.

Traditional public clouds always ran off-premises, but today's public cloud providers have started offering cloud services on clients' on-premise data centers. This has made location and ownership distinctions obsolete.

All clouds become public clouds when the environments are partitioned and redistributed to multiple tenants. Fee structures aren't necessary characteristics of public clouds anymore, since some cloud providers (like the Massachusettes Open Cloud) allow tenants to use their clouds for free. The bare-metal IT infrastructure used by public cloud providers can also be abstracted and sold as IaaS, or it can be developed into a cloud platform sold as PaaS.



4.2 Private Clouds

Private clouds are loosely defined as cloud environments solely dedicated to a single end user or group, where the environment usually runs behind that user or group's firewall. All clouds become private clouds when the underlying IT infrastructure is dedicated to a single customer with completely isolated access.

But private clouds no longer have to be sourced from on-prem IT infrastructure. Organizations are now building private clouds on rented, vendor-owned data centers located off-premises, which makes any location and ownership rules obsolete. This has also led to a number of private cloud subtypes, including:

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4.3 Managed Private Clouds

Customers create and use a private cloud that's deployed, configured, and managed by a third-party vendor. Managed private clouds are a cloud delivery option that helps enterprises with understaffed or underskilled IT teams provide better private cloud services and infrastructure.

4.4 Dedicated Clouds

A cloud within another cloud. You can have a dedicated cloud on a public cloud (e.g. Red Hat OpenShift® Dedicated) or on a private cloud. For example, an accounting department could have its own dedicated cloud within the organization's private cloud.

4.5 Hybrid Clouds

A hybrid cloud is a seemingly single IT environment created from multiple environments connected through local area networks (LANs), wide area networks (WANs), virtual private networks (VPNs), and/or APIs.
The characteristics of hybrid clouds are complex and the requirements can differ, depending on whom you ask. For example, a hybrid cloud may need to include:

- At least 1 private cloud and at least 1 public cloud
- 2 or more private clouds
- 2 or more public clouds
- A bare-metal or virtual environment connected to at least 1 public cloud or private cloud

V. CLOUD SERVICES

Cloud services are infrastructure, platforms, or software that are hosted by third-party providers and made available to users through the internet. There are 3 main types of as-a-Service solutions: IaaS, PaaS, and SaaS. Each facilitates the flow of user data from front-end clients through the internet, to the cloud service provider's systems, and back—but vary by what's provided.

5.1 IaaS

IaaS means a cloud service provider manages the infrastructure for you—the actual servers, network, virtualization, and data storage—through an internet connection. The user has access through an API or dashboard, and essentially rents the infrastructure. The user manages things like the operating system, apps, and middleware while the provider takes care of any hardware, networking, hard drives, data storage, and servers; and has the responsibility of taking care of outages, repairs, and hardware issues. This is the typical deployment model of cloud storage providers.

5.2 PaaS

PaaS means the hardware and an application-software platform are provided and managed by an outside cloud service provider, but the user handles the apps running on top of the platform and the data the app relies on. Primarily for developers and programmers, PaaS gives users a shared cloud platform for application development and management (an important DevOps component) without having to build and maintain the infrastructure usually associated with the process.

5.3 SaaS

SaaS is a service that delivers a software application—which the cloud service provider manages—to its users. Typically, SaaS apps are web applications or mobile apps that users can access via a web browser. Software updates, bug fixes, and other general software maintenance are taken care of for the user, and they connect to the cloud applications via a dashboard or API. SaaS also eliminates the need to have an app installed locally on each individual user's computer, allowing greater methods of group or team access to the software.

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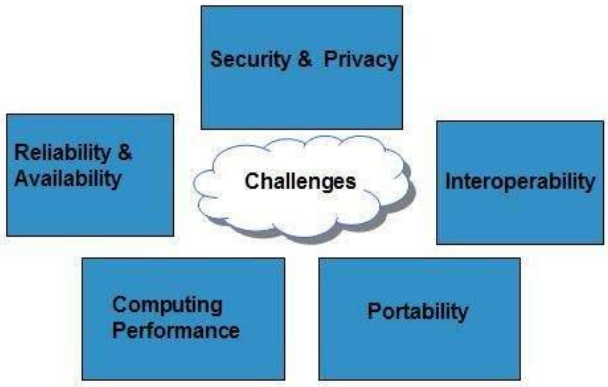
VI. CLOUD COMPUTING CHALLENGES

6.1 Security and Privacy

Security and Privacy of information is the biggest challenge to cloud computing. Security and privacy issues can be overcome by employing encryption, security hardware and security applications.

6.2 Portability

This is another challenge to cloud computing that applications should easily be migrated from one cloud provider to another. There must not be vendor lock-in. However, it is not yet made possible because each of the cloud provider uses different standard languages for their platforms.



6.3 Interoperability

It means the application on one platform should be able to incorporate services from the other platforms. It is made possible via web services, but developing such web services is very complex.

Computing Performance

Data intensive applications on cloud requires high network bandwidth, which results in high cost. Low bandwidth does not meet the desired computing performance of cloud application.

Reliability and Availability

It is necessary for cloud systems to be reliable and robust because most of the businesses are now becoming dependent on services provided by third-party.

VII. CONCLUSION

Cloud computing provides advanced computing resources available on-demand, that scale as needed, with regular updates and without the need to buy and maintain an on-premise infrastructure. With cloud computing, teams become more efficient and reduce time to market as they can rapidly acquire, scale services, without the considerable effort that requires managing a traditional on-premise infrastructure. See Atlassian's cloud offerings.

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