CLOUD COMPUTING

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INTRODUCTION:-

Cloud computing is a general term for the delivery of hosted services over the internet. Cloud computing enables companies to consume a compute resource, such as virtual machine (VMs), storage or an application, as a utility -- just like electricity -- rather than having to build and maintain computing infrastructures in house. Cloud computing boasts several attractive benefits for businesses and end users. Three of the main benefits of cloud computing are:

- Self-service provisioning: End users can spin up compute resources for almost any type of workload on demand. This eliminates the traditional need for IT administrators to provision and manage compute resources.
- Elasticity: Companies can scale up as computing needs increase and scale down again as demands decrease. This eliminates the need for massive investments in local infrastructure which may or may not remain active.
- Pay per use: Compute resources are measured at a granular level, allowing users to pay only for the resources and workloads they use.

Cloud computing deployment models Cloud computing services can be private, public or hybrid.

COMPUTING:- Private cloud services are delivered from a business' data center to internal users. This model offers versatility and convenience, while preserving the management, control and security common to local data centers. Internal users may or may not be billed for services through IT chargeback.In the public cloud model, a third-party provider delivers the cloud service over the internet. Public cloud services are sold on demand, typically by the minute or hour. Customers only pay for the CPU cycles, storage or bandwidth they consume. Leading public cloud providers include Amazon Web Services (AWS), Microsoft Azure, IBM SoftLayer and Google Compute Engine.

Hybrid cloud is a combination of public cloud services and on-premises private cloud -- with orchestration and automation between the two. Companies can run mission-critical workloads or sensitive applications on the private cloud while using the public cloud for bursting workloads that must scale on demand. The goal of hybrid cloud is to create a unified, automated,

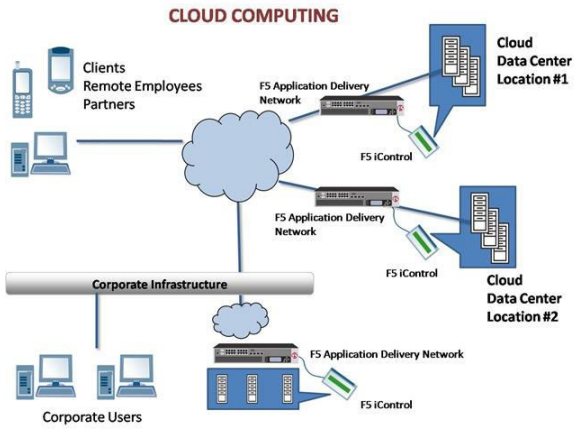
scalable environment that takes advantage of all that a public cloud infrastructure can provide while still maintaining control over mission-critical data.Cloud computing service categories Although cloud computing has changed over time, it has been divided into three broad service categories: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS).IaaS providers, such as AWS, supply a virtual server instance and storage, as well as application program interfaces (APIs) that let users migrate workloads to a virtual machine. Users have an allocated storage capacity and can start, stop, access and configure the VM and storage as desired. IaaS providers offer small, medium, large, extra-large and memory- or compute-optimized instances, in addition to customized instances, for various workload needs.

In the PaaS model, providers host development tools on their infrastructures. Users access these tools over the internet using APIs, web portals or gateway software. PaaS is used for general software development, and many PaaS providers will host the software after it's developed. Common PaaS providers include Salesforce.com's Force.com, AWS Elastic Beanstalk and Google App Engine.

SaaS is a distribution model that delivers software applications over the internet; these applications are often called web services. Microsoft Office 365 is a SaaS offering for productivity software and email services. Users can access SaaS applications and services from any location using a computer or mobile device that has internet access.

Cloud computing security

Security remains a primary concern for businesses contemplating cloud adoption -- especially public cloud adoption. Public cloud providers share their underlying hardware infrastructure between numerous customers, as public cloud is a multi-tenant environment. This environment demands copious isolation between logical compute resources. At the same time, access to public cloud storage and compute resources is guarded by account logon credentials.



Characteristics

Cloud computing exhibits the following key characteristics:

- Agility for organizations may be improved, as cloud computing may increase users' flexibility with re-

provisioning, adding, or expanding technological infrastructure resources.

- Cost reductions are claimed by cloud providers. A public-cloud delivery model converts capital expenditures (e.g., buying servers) to operational expenditure.This purportedly lowers barriers to entry, as infrastructure is typically provided by a third party and need not be purchased for one-time or infrequent intensive computing tasks. Pricing on a utility computing basis is "fine-grained", with usage-based billing options. As well, less in-house IT skills are required for implementation of projects that use cloud computing. The e-FISCAL project's state-of-the-art repository contains several articles looking into cost aspects in more detail, most of them concluding that costs savings depend on the type of activities supported and the type of infrastructure available in-house.
- Device and location independence enable users to access systems using a web browser regardless of their location or what device they use (e.g., PC, mobile phone). As infrastructure is off-site (typically provided by a third-party) and accessed via the Internet, users can connect to it from anywhere.Maintenance of cloud computing applications is easier, because they do not need to be installed on each user's computer and can be accessed from different places (e.g., different work locations, while travelling, etc.).
- Multitenancy enables sharing of resources and costs across a large pool of users thus allowing for:
  - centralization of infrastructure in locations with lower costs (such as real estate, electricity, etc.)
  - peak-load capacity increases (users need not engineer and pay for the resources and equipment to meet their highest possible load-levels)
  - utilisation and efficiency improvements for systems that are often only 10–20% utilised.[46][47]
- Performance is monitored by IT experts from the service provider, and consistent and loosely coupled architectures are constructed using web services as the system interface.
- Productivity may be increased when multiple users can work on the same data simultaneously, rather than waiting for it to be saved and emailed. Time may be saved as information does not need to be re-entered when fields are matched, nor do users need to install application software upgrades to their computer.
- Reliability improves with the use of multiple redundant sites, which makes well-designed cloud computing suitable for business continuity and disaster recoveryScalability and elasticity via dynamic ("on-demand") provisioning of resources on a fine-grained, self-service basis in near real-time (Note, the VM startup time varies by VM type, location, OS and cloud providers[], without users having to engineer for peak loads This gives the ability to scale up when the usage need increases or down if resources are not being used.
- Security can improve due to centralization of data, increased security-focused resources, etc., but concerns can persist about loss of control over certain sensitive data, and the lack of security for stored kernels. Security is often as good as or better than other traditional systems, in part because service providers are able to devote resources to solving security

issues that many customers cannot afford to tackle or which they lack the technical skills to address.However, the complexity of security is greatly increased when data is distributed over a wider area or over a greater number of devices, as well as in multi-tenant systems shared by unrelated users. In addition, user access to security audit logs may be difficult or impossible. Private cloud installations are in part motivated by users' desire to retain control over the infrastructure and avoid losing control of information security.

The National Institute of Standards and Technology's definition of cloud computing identifies "five essential characteristics":

Limitations and disadvantages

According to Bruce Schneier, "The downside is that you will have limited customization options. Cloud computing is cheaper because of economics of scale, and — like any outsourced task — you tend to get what you get. A restaurant with a limited menu is cheaper than a personal chef who can cook anything you want. Fewer options at a much cheaper price: it's a feature, not a bug." He also suggests that "the cloud provider might not meet your legal needs" and that businesses need to weigh the benefits of cloud computing against the risks. In cloud computing, the control of the back end infrastructure is limited to the cloud vendor only. Cloud providers often decide on the management policies, which moderates what the cloud users are able to do with their deployment. Cloud users are also limited to the control and management of their applications, data and services. This includes data caps, which are placed on cloud users by the cloud vendor allocating certain amount of bandwidth for each customer and are often shared among other cloud users.

Privacy and confidentiality are big concerns in some activities. For instance, sworn translators working under the stipulations of an NDA, might face problems regarding sensitive data that are not encrypted.

Emerging trends

Cloud computing is still as much a research topic, as it is a market offering. What is clear through the evolution of cloud computing services is that the chief technical officer (CTO) is a major driving force behind cloud adoption. The major cloud technology developers continue to invest billions a year in cloud R&D; for example: in 2011 Microsoft committed 90% of its US$9.6bn R&D budget to its cloud.Centaur Partners also predict that SaaS revenue will grow from US$13.5B in 2011 to $32.8B in 2016. This expansion also includes Finance and Accounting SaaS. Additionally, more industries are turning to cloud technology as an efficient way to improve quality services due to its capabilities to reduce overhead costs, downtime, and automate infrastructure deployment.

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