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CLOUD COMPUTING

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ABSTRACT: *Cloud computing is offering utility oriented IT services to users world wide. It enables hosting of applications from consumer,scientific and business domains. However data centres hosting cloud computing applications consume huge amounts of energy,contributing to high operational costs and carbon footprints to the environment. With energy shortages and global climate change leading our concerns these days, the power consumption of data centers has become a key issue. Therefore,we need green cloud computing solutions that can not only save energy,but also reduce operational costs. The vision for energy efficient management of cloud computing environments is presented here. A green scheduling algorithm which works by powering down servers when they are not in use is also presented.*

I. INTRODUCTION

The cloud providers manage the infrastructure and platforms on which the applications a light-weight desktop or mobile app while the business software and user's data are stored on servers at a remote location. Proponents claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables IT to more rapidly adjust resources to meet fluctuating and unpredictable business demand.

Cloud computing relies on sharing a network. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services.

History:

The cloud symbol was used to represent the Internet as early as 1994.

In the 1990s, telecommunications companies who previously offered primarily dedicated point-to-point data circuits, began offering virtual private network (VPN) services with comparable quality of service The underlying concept of cloud computing dates back to the 1950s; when large-scale mainframe became available in academia and corporations.

John McCarthy opined in the 1960s that "computation may someday be organized as a public utility." Almost all the modern-day characteristics of cloud computing (the comparison to the electricity industry and the use of public, private, government, and community forms, were thoroughly explored in Douglas Parkhill's 1966 book, *The Challenge of the Computer Utility*. Other scholars have shown that cloud computing's.
In 2012 Smarter Computing foundation, cloud computing is a critical piece.

WHAT IS CLOUD COMPUTING?

Cloud computing refers to the use of Internet ("cloud") based computer technology for a variety of services. It is a style of computing in which dynamically scalable and often virtualised resources are provided as a service over the Internet. Users need not have knowledge of, expertise in, or control over the technology infrastructure "in the cloud" that supports them.

II. HOW DOES CLOUD COMPUTING WORKS

- Cloud computing systems generally have a front end, which is what the user sees, and a back end, which does all the work.
- Cloud computing shares some similarities with an older model of computing called timesharing. A timesharing computer system connects multiple users to a single computer processor through dumb terminals, which have a keyboard and monitor, but leave the computing to the central machine.
- While cloud computing promises to offload tasks like data storage and processing power, the model raises questions about data accessibility and security

III. CLOUD INFRASTRUCTURE

IAAS:

clouds include images in a virtual machine image library, raw (block) and file-based storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs), and software bundles.[46] Amies, Alex; Sluiman, Harm; Tong IaaS cloud providers supply these resources on demand from their large pools installed in data centers. For wide area connectivity, the Internet can be used or—in carrier clouds -- dedicated virtual private networks can be configured., Qiang Guo (July 2012). "Infrastructure as a Service Cloud Concepts". *Developing and Hosting Applications on the Cloud*. IBM Press. ISBN 978-0-13-306684-5.

To deploy their applications, cloud users then install operating system images on the machines as well as their application software. In this model, it is the cloud user who is responsible for patching and maintaining the operating systems and application software. Cloud providers typically bill IaaS services on a utility computing basis, that is, cost will reflect the amount of resources allocated and consumed.

IaaS refers not to a machine that does all the work, but simply to a facility given to businesses that offers users the leverage of extra storage space in servers and data centers.

Examples of IaaS include:

Amazon CloudFormation (and underlying services such as Amazon EC2), Rackspace Cloud, Terremark and Google Compute Engine.

Platform as a service (PaaS)

In the PaaS model, cloud providers deliver a computing platform typically including operating system, programming language execution environment, database, and web server. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers. With some PaaS offers, the underlying computer and storage resources scale automatically to match application demand such that cloud user does not have to allocate resources manually.

Examples of PaaS include: Amazon Elastic Beanstalk, Cloud Foundry, Heroku, Force.com, EngineYard, Mendix, Google App Engine, Microsoft Azure and OrangeScape.

Software as a service (SaaS)

Main article: Software as a service Cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. The cloud users do not manage the cloud infrastructure and platform on which the application is running. This eliminates the need to install and run the application on the cloud user's own computers simplifying maintenance and support. What makes a cloud application different from other applications is its elasticity.

This can be achieved by cloning tasks onto multiple virtual machines at run-time to meet the changing work demand. Load balancers distribute the work over the set of virtual machines. This process is inconspicuous to the cloud user who sees only a single access point. To accommodate a large number of cloud users, cloud applications can be multitenant, that is, any machine serves more than one cloud user organization. It is common to refer to special types of cloud based application software with a similar naming convention: desktop as a service, business process as a service, test environment as a service, communication as a service.

The pricing model for SaaS applications is typically a monthly or yearly flat fee per user, so price is scalable and adjustable if users are added or removed at any point.

Examples of SaaS include:google apps, innkeypos, Quickbooks Online, Limelight Video Platform, Salesforce.com and Microsoft Office 365.

Cloud clients

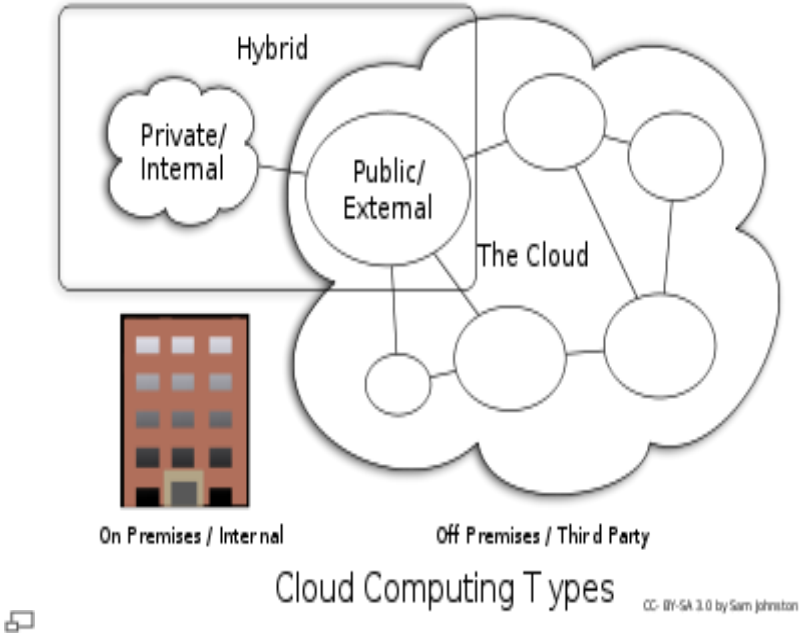
Users access cloud computing using networked client devices, such as desktop computers, laptops, tablets and smartphones. Some of these devices - *cloud clients* - rely on cloud computing for all or a majority of their applications so as to be essentially useless without it. Examples are thin clients and the browser-based Chromebook.

Many cloud applications do not require specific software on the client and instead use a web browser to interact with the cloud application.

With Ajax and HTML5 these Web user interfaces can achieve a similar or even better look and feel as native applications. Some cloud applications, however, support specific client software dedicated to these applications (e.g., virtual desktop clients and most email clients).

Some legacy applications (line of business applications that until now have been prevalent in thin client Windows computing) are delivered via a screen-sharing technology.

Deployment models



Cloud computing types

Public cloud

Public cloud applications, storage, and other resources are made available to the general public by a service provider. These services are free or offered on a pay-per-use model. Generally, public cloud service providers like Amazon AWS, Microsoft and Google own and operate the infrastructure and offer access only via Internet (direct connectivity is not offered.[27]

Community cloud

Community cloud shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.[4]

Hybrid cloud

Hybrid cloud is a composition of two or more clouds (private, community or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models.[4]
By utilizing "hybrid cloud" architecture, companies and individuals are able to obtain degrees of fault tolerance combined with locally immediate usability without dependency on internet connectivity. Hybrid cloud architecture requires both on-premises resources and off-site (remote) server-based cloud infrastructure.
Hybrid clouds lack the flexibility, security and certainty of in-house applications.[50] Hybrid cloud provides the flexibility of in house applications with the fault tolerance and scalability of cloud based services.

Private cloud

Private cloud is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted internally or externally.[4] Undertaking a private cloud project requires a significant level and degree of engagement to virtualize the business environment, and it will require the organization to reevaluate decisions about existing resources. When it is done right, it can have a positive impact on a business, but every one of the steps in the project raises security issues that must be addressed in order to avoid serious vulnerabilities.[51]
They have attracted criticism because users "still have to buy, build, and manage them" and thus do not benefit from less hands-on management,[52] essentially "[lacking] the economic model that makes cloud computing such an intriguing concept".[53][54]

Architecture

Cloud computing sample architecture *Cloud architecture*,[55] the systems architecture of the software systems involved in the delivery of cloud computing, typically involves multiple *cloud components*

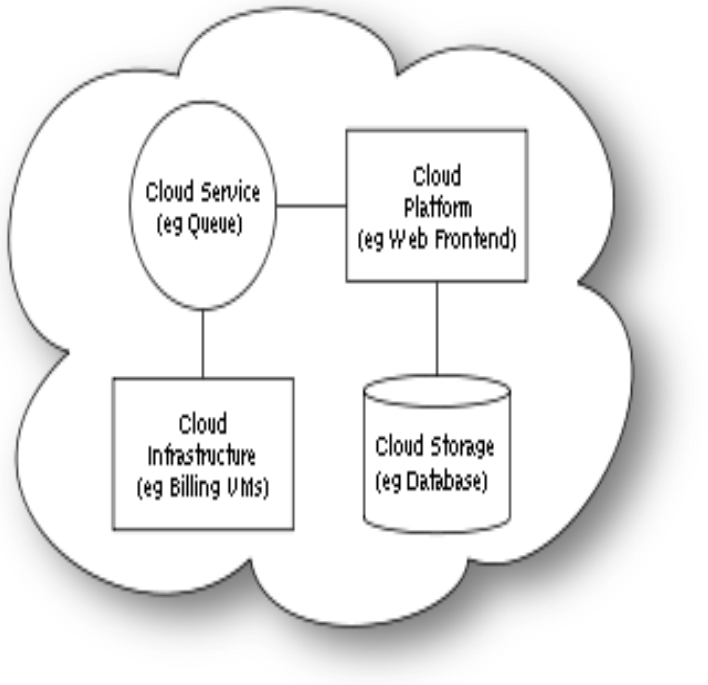
communicating with each other over a loose coupling mechanism such as a messaging queue. Elastic provision implies intelligence in the use of tight or loose coupling as applied to mechanisms such as these and others.

The Inter cloud

Main article: Intercloud The Intercloud[56] is an interconnected global "cloud of clouds"[57][58] and an extension of the Internet "network of networks" on which it is based.[59][60][61]

Cloud engineering

Cloud engineering is the application of engineering disciplines to cloud computing. It brings a systematic approach to the high-level concerns of commercialisation, standardisation, and governance in conceiving, developing, operating and maintaining cloud computing systems. It is a multidisciplinary method encompassing contributions from diverse areas such as systems, software, web, performance, information, security, platform, risk, and quality engineering.



Free software for cloud computing:

Open-source software has provided the foundation for many cloud computing implementations, prominent examples being the Hadoop framework[75] and VMware's Cloud Foundry.[76] In November 2007, the Free Software Foundation released the Affero General Public License, a version of GPLv3 intended to close a perceived legal loophole associated with free software designed to be run over a network.[77]

Open standard:

- Most cloud providers expose APIs that are typically well-documented but also unique to their implementation and thus not interoperable. Some vendors have adopted others' APIs and there are a number of open standards under development, with a view to delivering interoperability and portability.

Security:

- Cloud computing security
- Physical control and the ability to visually inspect the data links and access ports is required in order to ensure data links are not compromised.
- An alternative perspective on the topic of cloud security is that this is but another, although quite broad, case of "applied security" and that similar security principles that apply in shared multi-user mainframe security models apply with cloud security.
- The relative security of cloud computing services is a contentious issue that may be delaying its adoption. Physical control of the Private Cloud equipment is more secure than having the equipment off site

Sustainability

- Although cloud computing is often assumed to be a form of "green computing", there is no published study to substantiate this assumption. citing the servers affects the environmental effects of cloud computing.
- In areas where climate favors natural cooling and renewable electricity is readily available, the environmental effects will be more moderate. (The same holds true for "traditional" data centers.)
- Thus countries with favorable conditions, such as Finland, Sweden and Switzerland, are trying to attract cloud computing data centers. Energy efficiency in cloud computing can result from energy-aware scheduling and server consolidation.

IV. CONCLUSION

Cloud computing is a better way to run your business. Instead of running your apps yourself, they run on a shared data center. When you use any app that runs in the cloud, you just log in, customize it, and start using it. That's the power of cloud computing.

Finally, cloud apps don't eat up your valuable IT resources, so your CFO will love it. This lets you focus on deploying more apps, new projects, and innovation

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