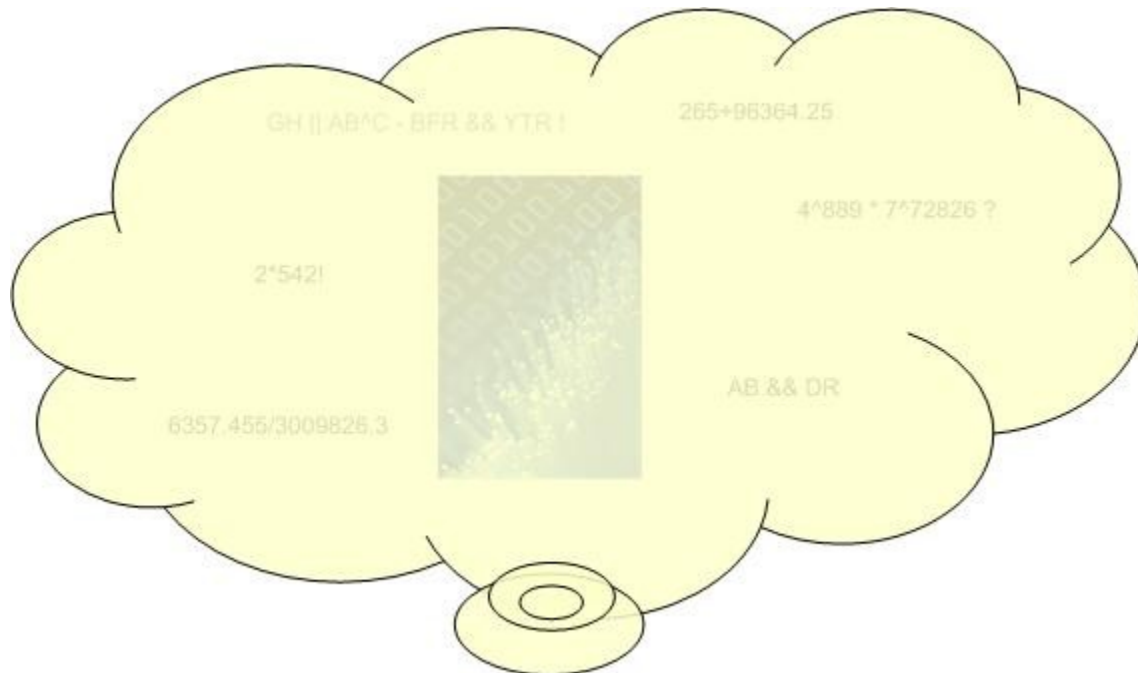


Cloud Computing



Abstract

Resource sharing in a pure plug and play model that dramatically simplifies infrastructure planning is the promise of 'cloud computing'. The two key advantages of this model are ease-of-use and cost-effectiveness. Though there remain questions on aspects such as security and vendor lock-in, the benefits this model offers are many. This paper explores some of the basics of cloud computing with the aim of introducing aspects such as:

- Realities and risks of the model
- Components in the model
- Characteristics and Usage of the model

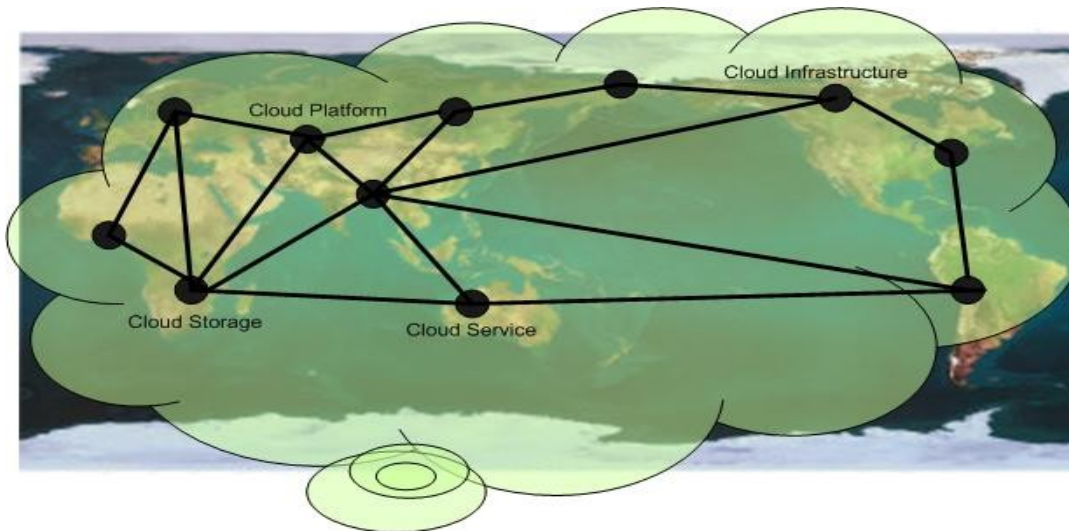
The paper aims to provide a means of understanding the model and exploring options available for complementing your infrastructure needs.

Introduction

Cloud Computing is:

A pool of scalable IT-enabled capabilities which can be utilized over the internet (cloud) as a service.

The idea of cloud computing is based on a very fundamental principal of `reusability of IT capabilities`. The difference that cloud computing brings compared to traditional concepts of “grid computing”, “distributed computing”, “utility computing”, or “autonomic computing” is to broaden horizons across organizational boundaries.



Forrester's definition of Cloud Computing:

*"A pool of abstracted, highly scalable, and managed compute infrastructure capable of hosting end-customer applications and billed by consumption." **

According to the IEEE Computer Society Cloud Computing is:

"A paradigm in which information is permanently stored in servers on the Internet and cached temporarily on clients that include desktops, entertainment centers, table computers, notebooks, wall computers, handhelds, etc."

Though many cloud computing architectures and deployments are powered by grids, based on autonomic characteristics and consumed on the basis of utilities billing, the concept of a cloud is fairly distinct and complementary to the concepts of grid, SaaS, Utility Computing etc.

In theory, cloud computing promises availability of all required hardware, software, platform, applications, infrastructure and storage with an ownership of just an internet connection.

**Source: March 7, 2008. Is Cloud Computing Ready For The Enterprise? - By James Staten*

Conventional computing model	Cloud service model *
Applications <ul style="list-style-type: none"> • Client-side apps • Client/server apps • Web interface to local server app • Data and process resides on PC or on local server 	End user cloud services <ul style="list-style-type: none"> • Rich Internet applications • Web 2.0 technologies • Software-as-a-service • Data and process resides at service provider
Developer tools and techniques <ul style="list-style-type: none"> • Client-side development tool • Service-oriented architecture (SOA) • Composite applications • Proprietary APIs, such as Win32 	App-components-as-a-service <ul style="list-style-type: none"> • Internet-hosted software services that enable mashups • Web-hosted development tools • Community development tools for shared templates and code • Proprietary service provider APIs and schema
Middleware <ul style="list-style-type: none"> • App server • File and object stores • Database • Integration server 	Software-platform-as-a-service <ul style="list-style-type: none"> • Hosted app platform • Hosted data, file, and object stores • Hosted database • Software-integration-as-a-service
Physical infrastructure <ul style="list-style-type: none"> • Servers • Disks • Networks • Systems management 	Virtual-infrastructure-as-a-service <ul style="list-style-type: none"> • Virtual servers • Storage shares • Virtual LAN configurations • Management-as-a-service

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Source: Forrester Research, Inc.

**Source: August 28, 2008, Future View: The New Tech Ecosystems Of Cloud, Cloud Services, And Cloud Computing. -By Frank E. Gillett*

Components of a Cloud

Cloud computing is a paradigm shift in the way scalable applications are architected and delivered. Since decades, enterprises have spent time and resources building an infrastructure that could provide them a competitive advantage. In most cases this approach resulted in:

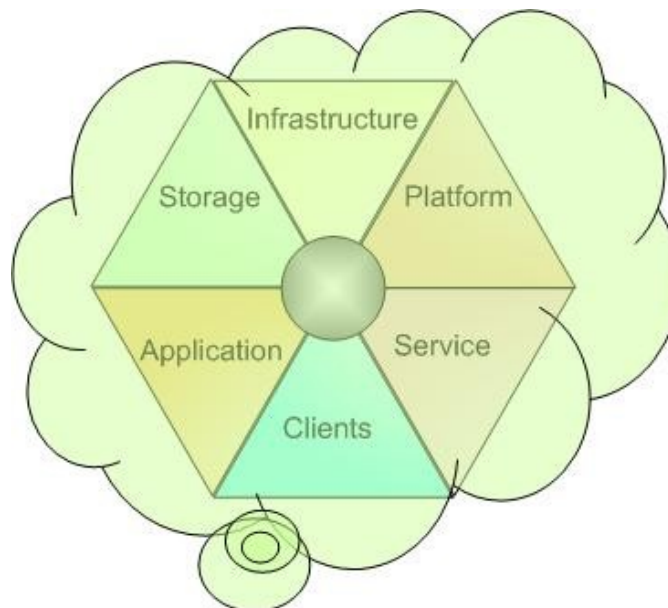
- Large tracts of unused computing capacity
- Dedicated resources for server maintenance
- Risk mitigation & energy utilization
- High cost for build, acquire, own & maintain (Total cost of ownership)

With cloud computing, excess computing capacity can be put to use and be profitably sold to consumers. This transformation of computing and IT infrastructure into a utility, which could be available to all, is the basis of cloud computing. It forces competition based on innovation rather than computing resources.

There are different colored clouds present in the computing space today which could be classified into the following components:

Infrastructure:

Cloud Infrastructure is the concept of providing `hardware as a service` i.e. shared/reusable hardware for a specific time of service. Example includes virtualization, grid computing, and paravirtualization. This service helps reduce maintenance and usability costs, considering the need for infrastructure management & upgrade.



Storage:

Cloud Storage is the concept of separating data from processing and storing in a remote place. Cloud Storage also includes database services. Examples are Google's BigTable, Amazon's SimpleDB etc.

A Cloud Platform is a service for application deployment and managing the required hardware & software needs. This could be a single service platform or a solution stack. Examples include Web application frameworks, Web hosting etc.

Application:

A Cloud Application is an offering of software architecture that eliminates the need to install, run and maintain an application at the user’s desktop/device. A cloud application eliminates the cost/resources required to maintain and/or support applications.

Services:

A Cloud Service is an independent piece of software which can be used in conjunction with other services to achieve an interoperable machine-to-machine interaction over the network. Examples include Amazon’s Simple Queue Service, Google maps, Amazon’s flexible payment service etc.

Client:

Cloud Client is a requester software or hardware device which tries to utilize cloud computing services over the network. The client device could be a Web browser, PC, laptop or mobile etc.

Cloud computing offerings could be divided in 6 different characteristics as below:

Cloud service characteristics	Details
Standardized IT-based capability	<ul style="list-style-type: none"> IT-based, meaning that it has compute, storage, network, or software-based capabilities, solely or in combination Standard offering defined by the service provider, with little or no flexibility for customization outside the offering
Accessible via Internet protocols from any computer	<ul style="list-style-type: none"> Modern Internet-type protocols over IP, such as HTTP, Representational State Transfer (REST), or Simple Object Access Protocol (SOAP) that are part of any modern operating system Uses a standard Web browser to access the user interface, without any unusual software add-ons or specific OS requirements
Always available, and scales automatically to adjust to demand	<ul style="list-style-type: none"> Resilient and highly available Service provider offers massive capacity, such that any given customer can get as much capacity as they need at a given moment — and give it back when not needed
Pay-per-use or advertising-based	<p>Free or pay-per-use, usually without long-term contracts, setup charges, or exit fees. The service is paid for one of three ways:</p> <ol style="list-style-type: none"> Advertising, usually for consumers Subscription, billed by availability per unit of time, such as a month or less Transaction, billed for actual usage, such as minutes of compute time, gigabytes of network bandwidth, or gigabytes of storage.
Web or programmatic-based control interfaces	<ul style="list-style-type: none"> Cloud-oriented Web sites with human interfaces host the customers data, provide interactions with others, and offer a rich Internet application interface, such as Facebook or Microsoft Virtual Earth 3D. Service-based interfaces use XML and REST-style software connection standards, such as the Flickr API or the Amazon S3 API
Offers full customer self-service	<ul style="list-style-type: none"> Customers can provision, manage, and terminate services themselves, without involving the service provider Control is via a Web interface or programmatic calls to service APIs

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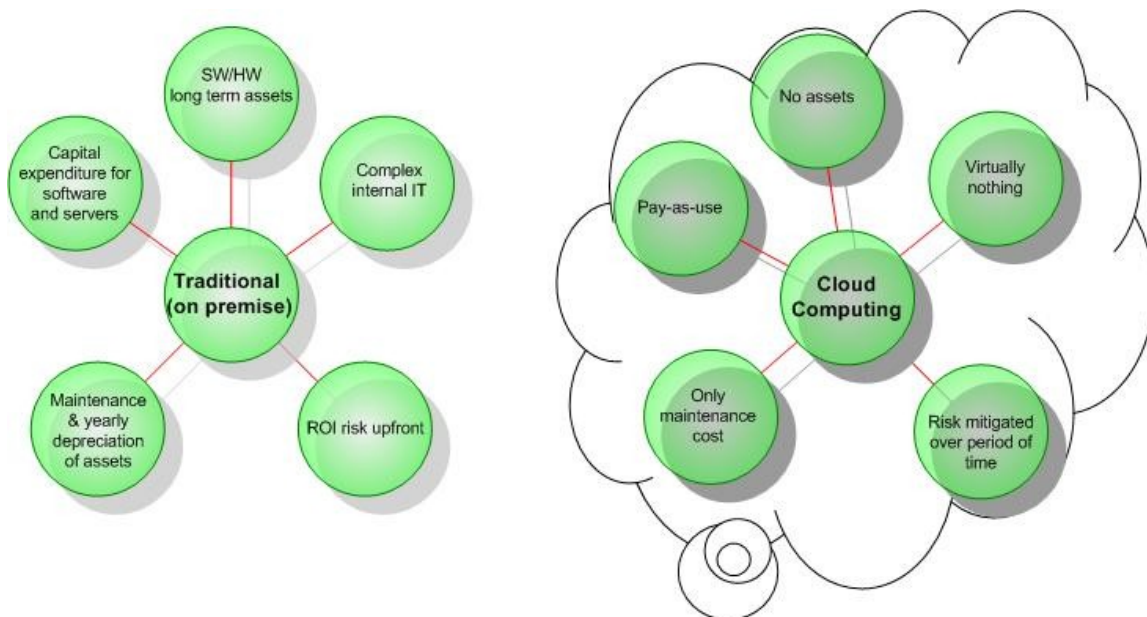
Source: Forrester Research, Inc.

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Benefits from a cloud

With the different Cloud enabler technologies like utility computing, Grid Computing, RTI, web infrastructure and others maturing, the different services would be cloud enabled.

1. Infrastructure service providers are taking advantage of the paradigm and offering Cloud Services. Cloud computing is considered an extension to SOA and SaaS.
2. Information services, entertainment-oriented services such as video on demand, simple business services such as customer authentication or identity management and contextual services such as location or mapping services are positioned well to become cloud-delivered.
3. Other services, such as corporate processes (for example, billing, deduction management and mortgage calculation) and transactional services (for example, fiscal transactions), would take longer to reach the cloud and the mainstream.



Another aspect to be considered is the existing relationship between vendors and buyers. Traditionally vendors were sellers of technologies, products and services to customers. The relationship between vendor and seller was simple, one would sell and the other would buy. Vendors have taken advantage of this relationship to license technology to users with frequent upgrades, often creating a cascade of price increases and feature proliferation regardless of need. Users have had to deal with changes to those technologies.

With cloud computing, ownership of technologies, products and services moves from consumers to the providers of service from which consumers will buy capabilities they require. Thus Cloud computing promotes provider - consumer relationship and not a vendor - user relationship.

Questions on a Cloud!

That said, as with any maturing computing style, cloud computing bears risk:

1. Amazon and Google are early participants in cloud computing services, with brand names that convey quality. Aside from some big names in the market, maturity and reliability of cloud computing services remain spotty.
2. Many cloud services will be bought and acquired outside the formal IT delivery portfolio. They will need coordination and analysis: Many will touch established processes and information flows, and their business impact must be weighed in terms of speed, flexibility and potential disruption.
3. Security concerns: Enterprises are reluctant to buy an assurance of business data security from vendors. They fear losing data to competition and the data confidentiality of consumers. In many instances, the actual storage location is not disclosed, adding onto the security concerns of enterprises.
4. Lack of commercial support: Currently, there are a few players offering cloud computing services, which practically force a vendor lock-in. Enterprises are concerned about the vendor dependency this creates and need to factor in risk mitigation.
5. Compliance & standards: The standards for cloud computing services are still evolving. There are offerings available that may not be fully compliant to the auditing and security needs of enterprises.

With cloud computing, the action moves to the interface — that is, to the interface between service suppliers and multiple groups of service consumers. Cloud services will demand expertise in distributed services, procurement, risk assessment and service negotiation — areas that many enterprises are only modestly equipped to handle.

Torry Harris in Cloud Computing

Torry Harris Business Solutions Inc, a US based IT services provider with a large base of technologists located in the UK, India and China has provided cost effective solutions at a design, development and support level to a variety of enterprise clients across the world since 1998. The company specializes in integration, distributed computing, and its focus on SOA is a result of nearly a decade of expertise gathered in the middleware space. The company has partnerships with almost all the leading SOA and integration product vendors. SOA, involving the creation of autonomous parts of a solution, lends itself admirably to the cost effective model of offshore service collaboration. In the cloud computing space, Torry Harris partners with leading infrastructure providers to offer packaged services for SOA initiatives during the implementation, testing and maintenance phases.

Further information about the company and a variety of white papers on SOA are available at www.thbs.com/soa.

For more information, write to us at soa@thbs.com.