Understanding Cloud Computing
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What is Cloud Computing?

Cloud computing is not a new concept. We have been using Cloud Computing for ages, in one form or other. In simple words, you can presume Cloud to be a very large server on which different services and data are stored and you access all those for your work. The software and data that you access for your work doesn't exist on your computer instead it's on the server. This concept of using services not stored on your system is called Cloud Computing.

Cloud Computing is not an object in itself, rather it comprises services and database that are accessed via web or any private network.

Key Cloud Computing providers: IBM, HP, Google, Microsoft, Amazon Web Services, Salesforce.com, NetSuite, VMware etc.

Examples of Cloud Computing : Examples of Cloud Computing services includes Google Docs, Office 365, DropBox, SkyDrive etc.

Cloud Computing Architecture

Cloud Computing architecture is divided into following two sections:

1. Interface- Software used to access cloud service and data
2. Infrastructure- Server that stores data and applications

Web browsers and mobile-apps are example of interface used to access the cloud services. Back-end applications and servers are the core of Cloud Computing.

Other Definitions of Cloud Computing

Wikipedia:

Cloud Computing comprises everything from Google Apps to data center services to virtualization to software. Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a metered service over a network. (source:Wikipedia)

National Institute of Standards and Technology (NIST) :

NIST defines Cloud Computing as an evolving paradigm. TIST defines Cloud Computing as a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

Types of Cloud Computing

Cloud Computing is composed of three service models and four deployment methods.

Cloud Computing Service Models

1. Infrastructure as a Service (IaaS)
2. Platform as a Service (PaaS)
3. Software as a Service (SaaS).

Infrastructure as a Service (IaaS): The IaaS layer offers storage and infrastructure resources that is needed to deliver the Cloud services. It only comprises of the infrastructure or physical resource.

Prominent IaaS Cloud Computing Companies

- Amazon (EC2)
- Rackspace
- GoGrid
- Microsoft
- Terremark
- AT&T
- Google
- Softlayer
- HP
- OpSource

Platform as a Service (PaaS): PaaS provides the combination of both, infrastructure and application. Hence, organisations using PaaS don't have to worry for infrastructure nor for services.

Prominent PaaS Cloud Computing Companies

- Salesforce.com
- Google
- Concur Technologies
- Ariba
- Unisys
- Cisco

Software as a Service (SaaS): In the SaaS layer, the Cloud service provider hosts the software upon their servers. It can be defined as a in model in which applications and softwares are hosted upon the server and made available to customers over a network.

Prominent SaaS Cloud Computing Companies

- Amazon Web Services
- AppScale
- CA Technologies
- Engine Yard
- Salesforce
- Windows Azure
- Open Stack

Cloud Computing Deployment Models

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

Private Cloud: The cloud infrastructure is operated solely for an organisation. In simple words we can say that such cloud models are dedicated to a third party who wish to use. It may be managed by the Cloud Computing provider or any other third party.

Public Cloud: The cloud infrastructure is made available to the general public or a large industry group and is owned by the Cloud providers.

Hybrid Cloud: It's a combination of two or more clouds (private, community or public).

Community Cloud: This cloud infrastructure is shared by several organisations.

Referring to the NIST definition of Cloud Computing (Peter Mell and Tim Grance)

Advantages and Disadvantages of Cloud Computing

Since the advent of the Internet, businesses have been introduced to a whole new avenue in their day-to-day interactions. With the instant ability to access files and information in real time and anywhere in the world, people across the globe are implementing cloud computing into their organisations.

While cloud solutions have been the answer for many, some are still hesitant to utilise this new tool. While there are advantages and disadvantages associated with most business models, it is largely up to the business owner or IT Department and the nature of the company's daily transactions that dictate whether this system is right for their industry.

Advantages of Cloud Computing

1. Pay-Per-Use Model / Only Pay for What You Utilize

Unlike many computing programs where the package comes with unnecessary applications, the cloud allows users to literally get what they pay for. This scalability allows for you to simply purchase the applications and data storage you really need.

"Pay-Per-Use" Billing Model Cloud usage policy defines that you will be billed for cloud resources as you use them. This pay-as-you-go model means usage is metered and you pay only for what you consume. Users have to pay only for the resources they use, ultimately helping them keep their costs down. Because this pay-for-what-you-use model resembles the way electricity, fuel and water are consumed, it's sometimes referred to as utility computing.

Mobility - Userss can access information wherever they are, rather than being dependent on the infrastructure.

Elasticity – The cloud is elastic, meaning resources, softwares and the infrastructure can be scaled up or decreased, depending upon the need.

Service Based Usage Model – Availability of large computing infrastructure and the services on need basis.

2. Mobility

One of the main advantages of working in the cloud is that it allows users the mobility necessary in this day and age of global marketing. For example, a busy executive on a business trip in Japan may need to know what is going on at the company headquarters in Australia. Rather than having to make phone calls and rely on the reports of employees, they can simply check updated statistics online. The Internet is, for the most part, everywhere. Therefore, cloud computing allows the mobility necessary for success.

3. Versatile Compatibility

It is an ongoing debate: which is better, the Mac or PC? Despite which side of the fence you stand on this argument, it makes no difference when it comes to implementing cloud solutions into a business model. Users are often surprised to find that the various cloud apps available are accessible on both platforms.

4. Individuality

One of the most convenient aspects of working in the cloud is that it is compatible with aspects specific to the company. For example, cloud IT services can be scaled to meet changing system demands within a single company.

Disadvantages of Cloud Computing

While the cloud benefits are numerous, this method of computation is not for all businesses. There are certain disadvantages that could persuade you that this system is not for your company, and it

takes careful consideration and professional advice to determine if this is the case in any specific circumstance.

1. Less Control

Utilising the public cloud in business does have an obvious downside. By using this technology you risk losing a level of control over your company. While many IT managers are experimenting with various ways of implementing an in-house cloud system that runs on delivered metered services, this is not always the most lucrative business move.

2. Security and Confidentiality

Since technology has started to expand in the exponential ways we are seeing in this day and age, cyber-crime has become a concerning issue. Cloud computing does pose the risk of increased security threats. While most companies have an up-to-date virus database, this does not make the files and information stored in the cloud immune to hackers.

3. Not Always Enough Room

Many have been disappointed with cloud technology, because they find that once they have instituted a cloud system within their business, they run out of storage space. While it is possible to update the system, it can be a painstaking process.

The extent of these advantages and disadvantages to cloud computing will vary from business to business, so it will be important for any business to weigh these up when considering their move into cloud computing. If you need more information or guidance, give us a call, we are happy to help provide you with the appropriate solution and determine the best IT strategy for you and your business moving forward.

Who Coined the Term Cloud Computing?

The term Cloud Computing has been derived from the use of a cloud image to represent the Internet (“cloud” referred to the cloud symbol).

NetCentric: Sean O’Sullivan, filed a trademark on “cloud computing” in 1997.

Compaq: George Favaloro, 1996 Compaq business plan was the first document known to use of the term “cloud computing” in print.

Google: The first use of “cloud computing” in its modern context occurred on August 9, 2006, when then Google CEO Eric Schmidt introduced the term to an industry conference.

NetCentric or Compaq or Google?

Was it NetCentric, document that filed for trademark on “cloud computing” in 1997 or was it Compaq’s George Favaloro, who claims- the first documented proof for the phrase “Cloud Computing.”

In a third view to the topic, many believe the first use of “cloud computing” in its modern context

occurred on August 9, 2006, when then Google CEO Eric Schmidt introduced the term to an industry conference.

Let's find out:

1996 – Compaq

Before this happened, in 1996, George Favaloro- believes he coined the term. Paper – 50-page internal Compaq analysis titled "Internet Solutions Division Strategy for Cloud Computing" dated November 14, 1996. The document accurately predicts that enterprise software would give way to Web-enabled services, and that in the future, "application software is no longer a feature of the hardware—but of the Internet."

1997 – NetCentric

In May 1997, NetCentric tried to trademark the "cloud computing" but later abandoned it in April 1999. Patent serial number 75291765. The trademark application was for "educational services" such as "classes and seminars" and was never approved. But the use of the phrase was not coincidental.

2006 – Google Conference Note

Eric Schmidt: "What's interesting [now] is that there is an emergent new model, and you all are here because you are part of that new model. I don't think people have really understood how big this opportunity really is. It starts with the premise that the data services and architecture should be on servers. We call it cloud computing – they should be in a "cloud" somewhere. And that if you have the right kind of browser or the right kind of access, it doesn't matter whether you have a PC or a Mac or a mobile phone or a BlackBerry or what have you – or new devices still to be developed – you can get access to the cloud. There are a number of companies that have benefited from that. Obviously, Google, Yahoo!, eBay, Amazon come to mind. The computation and the data and so forth are in the servers."

The first scholarly use of the term "Cloud Computing" was in a 1997 lecture by Ramnath Chellappa, stating "...computing paradigm where the boundaries of computing will be determined by economic rationale rather than technical limits alone."

History of Cloud Computing

The history of Cloud Computing dates back to the 1960s, when John McCarthy opined that "computation may someday be organised as a public utility." All the modern-day characteristics of Cloud Computing were thoroughly explained in Douglas Parkhill's 1966 book, "The Challenge of the Computer Utility." Analysts believe that Cloud Computing's find it's root back in the year 1950s when scientist Herb Grosch postulated that the entire world would operate on dumb terminals powered by about 15 large data centres.

In late 90s Amazon played a key role in the development of Cloud Computing. Amazon initiated a new product to provide Cloud Computing and launched Amazon Web Service (AWS) on a utility computing basis in 2006. In 2008, Eucalyptus and OpenNebula became the first open-source platform for deploying private clouds (Eucalyptus). Salesforce.com, founded in 1999, was the first successful example of providing software as a service in the business to business domain.

Salesforce is a CRM tool for sales executives providing features like managing customer details, running promotions etc. Google and Microsoft provide development platforms that can be accessed with "pay-per-use" billing model. All these services are examples of Cloud Computing. Amazon.com was one of the first vendors to provide storage space and computing software and services based upon the Cloud Computing model.

History of Cloud Computing: Timeline

1950: Scientist Herb Grosch (the author of Grosch's law) postulated that the entire world would operate on dumb terminals powered by about 15 large data centers.

1960: John McCarthy opined that "computation may someday be organised as a public utility"

1966: Douglas Parkhill's book, "The Challenge of the Computer Utility" explained all the modern-day characteristics of cloud computing

1969: ARPANET developed, UNIX created

1970: ARPANET transformed itself into Internet

1990: Internet age started

1991: CERN released Internet for general use

1993-94: Browsers such as Mosiac & Netscape launched

1995: The online auction website "eBay" was founded as AuctionWeb in San Jose, California, on September 5, 1995, by French-born Iranian-American computer programmer Pierre Omidyar. Jeff Bezos created Amazon.com, Inc. in 1994, and the site went online in 1995. It is named after the Amazon River, one of the largest rivers in the world, which in turn was named after Amazons, the legendary nation of female warriors in Greek mythology.

1999: Salesforce.com launched in March 1999 by former Oracle executive Marc Benioff, Parker Harris, Dave Moellenhoff, and Frank Dominguez as a company specializing in software as a service (SaaS). Napster launched.

2000: Dot com bubble bursts: After the dot-com bubble, Amazon played a key role in the development of cloud computing by modernising their data centers. Having found that the new cloud architecture resulted in significant internal efficiency improvements whereby small, fast-moving "two-pizza teams" could add new features faster and more easily, Amazon initiated a new product development effort to provide cloud computing to external customers.

2006: Amazon launched Amazon Web Service (AWS) on a utility computing basis although the initial released dated back to July 2002. Amazon Web Services (AWS) is a collection of remote computing services (also called web services) that together make up a cloud computing platform, offered over the Internet by Amazon.com. The most central and well-known of these services are Amazon EC2 and Amazon S3.

2007: Salesforce launches Force.com, a web productivity tool. Force.com is a cloud computing platform as a service system from Salesforce.com.

2008: Eucalyptus became the first open-source, AWS API-compatible platform for deploying private

clouds. Eucalyptus is a software platform for the implementation of private cloud computing on computer clusters. OpenNebula became the first open-source software for deploying private and hybrid clouds. OpenNebula is an open-source cloud computing toolkit for managing heterogeneous distributed data center infrastructures. OpenNebula is sponsored by C12G. C12G Labs is an enterprise software company which provides OpenNebula-based software and services. C12G (numeronym for Cloud Computing) was founded in April 2010.

2010: With launch of iPhone, HTC's first Android phone, Android-Apps, Samsung's smartphone and a whooping sale of 1 million iPad in the first month of it's launch, the enterprise market saw huge transformation that scripted a completely different IT market story driven totally by consumers. Cloud services got much needed boost with the launch of i-services for iPhone and iPad costumers. Cloud applications hosted on far away Data Centers became a rage which ultimately launched the golden era of cloud computing and services based upon "as a servrice" delivery-model.

2011: The year that truely made a mark for Cloud Computing. Several start-ups were founded that leveraged the cloud services. GSA moves 17,000 e-mail users to Google Apps for Government

DARPA seeks mission-resilient cloud to ensure military can withstand attack against pieces of the network.

2012: Energy Department sets up YourCloud to broker secure cloud services for agency and national labs. Salesforce.com unveils Government Cloud and AppExchange, multitenant services designed for the public sector.

2013: CIA inks $600 million deal with Amazon Web Services to build a private cloud, bolstering confidence in security of the cloud.

3 Prominent Cloud Computing Trends for 2014 by IEEE

Emergence of the Mobile Cloud

Mobile distributed computing paradigm will lead to explosion of new services. Mobile and cloud computing are converging to create a new platform—one that has the potential to provide unlimited computing resources. Mobile devices are constrained by their memory, processing power, and battery life. But combined with cloud computing, data processing and storage can happen outside of mobile devices. What IDC calls the "Third Platform" will allow for better synchronization of data, improved reliability and scalability, increased ease of integration, anytime-anywhere access to business applications and collaborative services, rich user experiences, and an explosion of new services.

From Internet of Things to Web of Things

Going beyond the Internet of Things, where identifiable objects are seamlessly integrated into the information network, the Web of Things takes advantage of mobile devices' and sensors' ability to observe and monitor their environments, increasing the coordination between things in the real world and their counterparts on the Web. The Web of Things will produce large volumes of data related to the physical world, and intelligent solutions are required to enable connectivity, inter-networking, and relevance between the physical world and the corresponding digital world resources.

From Big Data to Extreme Data

It's more than the three Vs—volume, velocity, and variety—that make big data such a difficult tiger to tame. It's that the technology world hasn't quite caught up with the need for trained data scientists and the demand for easy-to-use tools that can give industries—from financial and insurance companies to marketing, healthcare, and scientific research organization—the ability to put the data they gather into meaningful perspective. The current era of extreme data requires new paradigms and practices in data management and analytics, and in 2014 the race will be on to establish leaders in the space.

Forecast by Leading IT Companies: IDC, NetApp, Forrester, Rackspace & Red Hat

IDC

"Value will start to migrate "up the stack", from infrastructure as a service (IaaS) to platform as a service (PaaS) and from generic PaaS to data-optimized PaaS. The latter will be most evident as Amazon Web Services rolls out an avalanche of platform-as-a-service offerings for developers and higher value services for businesses. This will force incumbent IT suppliers – the companies that won market leadership in the 2nd Platform era (pre-mobile, big data, cloud) – to urgently reconfigure themselves to fight for position in the 3rd Platform (mobile, big data, cloud) marketplace. Joining them in the fight will be Google, which will realize it is at risk of being boxed out of a market where it should be vying for leadership." – Frank Gens, senior vice president and chief analyst at IDC

NetApp

"The tension within IT on moving to the cloud will resolve as organisations recognise that a hybrid cloud model is needed to serve their application portfolio. CIOs will sort their application portfolio into those they must control entirely (in on-premise private clouds), control partially (in enterprise public clouds), as well as workloads that are more transient (public hyperscale clouds), and those best purchased as SaaS. IT will act as brokers across these diverse cloud models. This will also uncover the need to easily move application data between clouds and to provision consistent storage service capabilities across different cloud models." – Jay Kidd, chief technical officer, NetApp

Forrester Research

"The combination of cloud and mobility, predicted and proven in 2013, means there's no longer a perimeter to your business you can control. Even if you tried to enforce perimeter controls they would not be very effective as so much of the work is shifting outside your perimeter to the public cloud. Additionally, users have so many devices now that you can't enforce device security such as NAC as the management overhead is too daunting. The focus needs to shift from protecting the network and the devices to protecting the data with a Zero Trust security model. With the network perimeter shrinking and the devices proliferating, your data is the one thing you can control," – James Staten, vice president and principal analyst, infrastructure and operations professional, Forrester Research

Rackspace

"More and more enterprises will need to adopt tactics normally associated with startups (e.g.: DevOps, continuous integration and delivery, agile development) in order to handle the need to support ever-changing digital fields such as mobile application development, web analytics and social media. In this transformation, system administrators will need to brush up on their coding or get left behind with the legacy applications. Database admins will need to make the jump to Big Data and NoSQL. The enterprise CIO who realizes how to make DevOps and agile development work in their organization will lead the way. This will take root in 2014 and continue to grow over the next 5 to 10 years as applications are replaced." – John Engates, chief technology officer, Rackspace

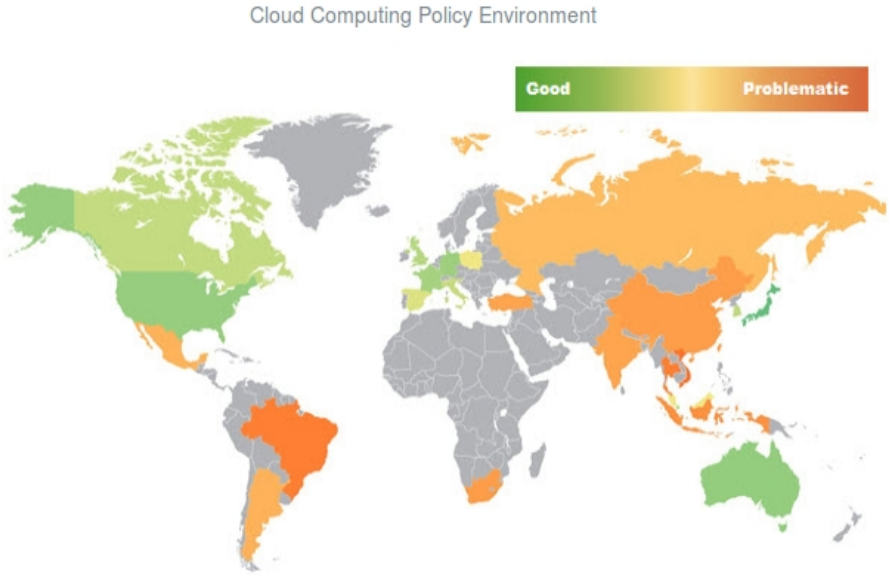
Red Hat

"In 2013 we saw the proliferation of OpenStack distributions, to the point where it feels very similar to the early days of Linux – everyone seems to have a Linux distribution. In 2014, we're going to see OpenStack distributions collapse. That's because it's not enough to just repackage bits; providers need really broad and deep knowledge of both OpenStack and Linux. Customers will look toward the organizations that have this deep knowledge as they seek credible solutions that combine OpenStack and Linux. The few companies that have the ability to offer tight integration between the two will be the last ones left standing." – Chuck Dubuque, director, product marketing, virtualization and OpenStack, Red Hat

Top 10 Countries Favourable for Cloud Computing

With the penetration of Cloud Computing increasing every day, more and more businesses across the globe are realising the importance of cloud computing. But, "which are the countries across the globe that aces the proliferation of Cloud Computing in their respective region?" Which contry stands ahead in the adoption of Cloud Computing?

The 2013 BSA Global Cloud Computing Scorecard, ranks the various countries according to their policies and initiatives towards Cloud Computing. The countries are ranked the basis of their support for Cloud & data privacy, security & cybercrime prevention, intellectual property rights, information technology readiness and internet penetration.



1	Japan	84.1
2	Australia	79.9
3	US	79.7
4	Germany	79.1
5	Singapore	78.5
6	France	78.3
7	United Kingdom	76.9
8	Korea	76.2
9	Canada	75.8
10	Italy	75.5

Why Japan is No. 1?

The study reveals, Japan, has a comprehensive suite of modern laws that supports the cloud computing. Japan exhibited a positive example last year by ratifing the Convention on Cybercrime. Japan has some comprehensive privacy and intellectual property laws that stands relevant to cloud computing. Broadband penetration in laso very high Japan, with Government ensuring, all households will have very high-speed fiber broadband connections by 2015

The biggest mover in the rankings is Singapore, which rised to 5th place from 10th place. Canada, India and Russia moved up in the ranking on the basis of their new policies such as, international IP agreements and Cloud policies. The study finds that all six European Union countries have lost the rankings.

Indian Cloud Computing Market Size & Growth

Major research companies such as, IDC and Gartner predicts the continuous growth for Indian Cloud Computing market. IDC estimates the Indian cloud computing market to grow $3 billion by

2015. Gartner expects, almost two-thirds of Indian CIOs will run and manage their business via cloud computing in coming two years.

The cloud computing market in India is expected to see ten-fold increase by 2015. Software as a Service (SaaS) will be a high demand in India, in comparison to the other cloud computing deployment models (Infrastructure as a Service (IaaS) and Platform as a Service (PaaS)).

The Public Cloud Computing market in India will demonstrate robust growth and is expected to reach 685 million by 2014, predicts Zinnov Research. Indian Software-as-a-Service (SaaS) Cloud market in India has grown upto 84 percent in the last 2 years and will reach 410 million by 2014 from the current IaaS market size of 150 million.

SaaS cloud market in India, dominated by email, CRM and ERP has grown at a CAGR of 46 percent (from 55-70 million) in just two years (2009-2011). The PaaS market in India has grown at a CAGR of 75 percent and the IaaS market in India has grown at a CAGR of 84 percent.

According to other industry forecasts, the Cloud Computing India market size is expected to grow up to $4.5 billion by 2015 at a CAGR of 40 percent by 2014. Cloud computing will push the Indian ICT market (software, services and hardware) and businesses in India would generously spend on various IT and Cloud. IDC projects, the overall IT spending India will reach to $44.8 billion in 2014.

This growth is on the sidelines of the worldwide IT spending projected to $3.8 trillion in 2014. The estimated worldwide IT spending is said to exhibit an increase of 3.1 percent from 2013 figures ($3.7 trillion).

BSA Cloud Computing Scorecard for India

India moved up in the annual Cloud Computing rankings based on various improvements in intellectual property, network proliferation, cloud infrastructure, privacy and security. In 2012, India updated its copyright laws to cover various modern copyright issues. However, the law and cloud infrastructure in India has not entirely kept pace with international developments in cloud computing. The current security standards in India still exhibits some gaps, prominently in areas of data protection law.

Cloud Computing Scorecard of India 53.1
Rank 17/24

Following seven criteria were evaluated: (criteria – score obtained)

Data Privacy 4.1
Security 4.4
Cybercrime 7.4
Intellectual Property Rights 12.0
Industry Standards 10.0
Promoting Free Trade 6.4
ICT Readiness, Broadband Deployment 8.8

The current state of privacy law in Indian is not compatible with the Privacy Principles in the EU Data Protection Directive and Privacy Principles in the APEC Privacy Framework. Study underlines the lack of an effective privacy and cybercrime legislation according to international models and

standards. India is not a signatory to the Convention on Cybercrime. However, India has it's own Information Technology Act that closely embodies the prohibitions contained in the Cybercime Convention.

Indian being a member of TRIPS, has not yet updated its copyright laws to fully comply with the TRIPS Agreement (amendments have been proposed). India has also not signed the WIPO Copyright Treaty.

Prominent Cloud Computing Standards Organizations

Cloud Standards Customer Council
http://www.cloud-council.org/

The hype around cloud has created a flurry of standards and open source activity leading to market confusion. As important as current standards development efforts are, they are not enough. There is a lack of a customer driven prioritization and focus within the cloud standards development process.

The Cloud Standards Customer Council is an end user advocacy group dedicated to accelerating cloud's successful adoption, and drilling down into the standards, security and interoperability issues surrounding the transition to the cloud.

The Council separates the hype from the reality on how to leverage what customers have today and how to use open, standards-based cloud computing to extend their organizations.

CSCC provides cloud users with the opportunity to drive client requirements into standards development organizations and deliver materials such as best practices and use cases to assist other enterprises.

Cloud Standards Customer Council founding enterprise members include IBM, Kaavo, CA Technologies, Rackspace & Software AG.

More than 400 of the world's leading organizations have already joined the Council, including Lockheed Martin, SAP, Citigroup, Fujitsu, State Street and North Carolina State University.

Cloud Security Alliance
https://cloudsecurityalliance.org/

The CSA is a member-driven organization, with an aim to promote the use of best practices for providing security assurance within Cloud Computing, and provide education on the uses of Cloud Computing to help secure all other forms of computing.

Open Cloud Consortium (OCC)
http://opencloudconsortium.org/

The Open Cloud Consortium (OCC)

- Supports the development of standards for cloud computing and frameworks for interoperating between clouds;
- develops benchmarks for cloud computing; and
- supports reference implementations for cloud computing, preferably open source reference implementations.

The OCC has a particular focus in large data clouds. It has developed the MalStone Benchmark for large data clouds and is working on a reference model for large data clouds.

The Open Group : Cloud Work Group

http://www.opengroup.org/

The Cloud Work Group exists to create a common understanding among buyers and suppliers of how enterprises of all sizes and scales of operation can include Cloud Computing technology in a safe and secure way in their architectures to realize its significant cost, scalability and agility benefits. It includes some of the industry's leading cloud providers and end-user organizations, collaborating on standard models and frameworks aimed at eliminating vendor lock-in for enterprises looking to benefit from cloud products and services.

Credit & Source:

http://en.wikipedia.org/
http://opencloudconsortium.org/
http://www.opengroup.org/
https://cloudsecurityalliance.org/
http://www.cloud-council.org/
http://www.technologyreview.com
http://sn.com.au/
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