Evolution of Cloud Storage as Cloud Computing Infrastructure Service

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ABSTRACT: Cloud computing is a way for providing information technology (IT) services where resources are taken from the Internet through web-based tools applications and opposed to a direct connection to a server. Cloud is not a particular product, but it is the way of delivering IT services that are consumable on demand, elastic to scale up and down as needed, and follow a pay-for-usage model. Out of the three common types of cloud computing models where Infrastructure as a Service (IaaS) is the service model that provides servers, computing power, network bandwidth and Storage capacity, as a service to their subscribers. Cloud can be relate to many things but without the basic storage pieces, which is provided the service namely Cloud Storage, none of the other applications is possible . This paper measure Cloud Storage, which covers the basic technologies in cloud computing and Cloud Storage, management insight tell about cloud computing, and driving forces of cloud computing and cloud storage,.The advantages and challenges of cloud storage and concludes by highlighting few challenges to be addressed by the cloud storage providers. Cloud computing is idea of taking all the heavy lifting involved in searching and processing data away from the device (computer and lap top) you carry around, or sit and work at, and moving that work to huge computer clusters far away in cyberspace.

Keywords - Cloud Computing, Cloud Storage, Cloud Storage API, IaaS, issues, reference model.

INTRODUCTION

Cloud computing is the using of computing services over the Internet. These services are range from top level infrastructure to complete SaaS (Software as a Service) solutions. Cloud service providers improve businesses focus on their core activities by handling all the infrastructural requirements.Most of individuals have access to some form of cloud solution such as emails, games, movies, pictures, documents, you name it. The range of services available on the cloud is extensive. Cloud solutions are very fast and becoming a preferred choice of businesses addressing a swathe of computing requirements. This versatile service has evolves cloud computing is an ideal solution for both of enterprises and individuals .

Cloud computing is highly scalable, acceptable and manageable. It saves all companies from investing on in-house infrastructure.It redirecting these funds for optimizing and growing their businesses. Cloud computing helps lots of enterprises ,Organisation and MNCs reduce to expenses incurred on managing their existing infrastructure for their future growth . Cloud service providers on-demand computing and autoscaling. This enables clients to upscale and downscale their computing requirements as needed.

RESEARCH METHODOLOGY

Based on a literature review and the service-level cloud interoperability use case , the new method-ology for the detection of interoperability problems among different providers of platform as a service was developed. This methodology uses semantic web an-notations, semantic web services, ontology and the AI planning method to detect and solve common interoperability problems. Remote PaaS API opera-tions are used to execute interoperability actions. The proposed methodology has five main steps: Require-ment identification; Interoperability analysis; Solution design; Solution implementation; and Evaluation.. The methodology uses aniterative approach, because platform as a service (PaaS) offers and their APIs evolve and change very often, so we can repeat these steps over time.The most important interoperability needs of users should be listed in the first step, i.e., interoperability ac-tions such as migration of data from one PaaS offer to another cloud storage, working with external cloud data in PaaS applications, communication between two ap-plications deployed on different PaaS offerings, compo-sition of two or more API operations of different provid-ers, etc. These actions can be derived from the available use cases presented in technical and research papers, deliverables of related projects, and proposals for cloud standards, where the authors have already done some research on user's interoperability requirements. Based on the identification of relevant interoperability actions, adequate use cases should be defined and described.

KEY TECHNOLOGIES

TYPES OF CLOUD

In a cloud computing system, there's a significant workload shift. Local computers no longer have to do all the heavy lifting when it comes to running applications. The network of computers that make up the cloud handles them instead which leads in reduction of hardware and software demands on the user's side. A typical cloud computing architecture is given in Fig.1. The only thing the user's computer needs to be able to run is the cloud computing systems interface software**,** which can be as simple as a Web browser, and the cloud's network takes care of the rest.

There are three common types of clouds available namely, Private, Public and Hybrid cloud which is represented in Fig. 2. A private cloud is based upon a pool of shared resources, whose access is limited within organizational boundaries. The resources are accessed over a private and secured intranet, and are all owned and controlled by the company‟s IT organization. In essence, the cloud computing business model is brought and managed in-house to enable shared IT services. A public cloud is a domain where the public Internet is used to obtain cloud services. The resources that make up those services are owned by the respective cloud service.
providers. Some examples include Salesforce.com, Google App Engine and Google search, Microsoft Azure, and Amazon Web services such as EC2

Fig. 1 A typical Cloud computing system

A Hybrid cloud is a combination of private and public clouds, where services from each domain are consumed in an integrated fashion and include an extended relationship with the selected external service providers.

Fig. 2 Three types of Cloud computing model

CLOUD COMPUTING SERVICE MODELS

Private and Public clouds serve as the backbone for a variety of different cloud computing service models given in Fig.3. Currently the industry has been successfully adopting three common types of cloud computing service models.
Infrastructure as a Service (IaaS), is a service model around servers (compute power), storage capacity, and network bandwidth. Examples include Amazon EC2 and S3, Rackspace, AT&T, and Verizon. Platform-as-a-Service (PaaS) provides an externally managed platform for building and deploying applications and services. This model typically provides development tools such as databases and development studios for working with the supplied frameworks, as well as the infrastructure to host the built application. Examples include Force.com, Microsoft Azure, and Google App Engine.

Software-as-a-Service (SaaS) is simply having a software system running on a computer that doesn't

belong to the customer and isn't on the customer‟s premises. It is based on the concept of renting an application

from a service provider rather than buying, installing and running software yourself.

KEY BENEFITS OF CLOUD COMPUTING

Management Insight, NH, USA, which is a dedicated market research consulting firm, conducted a study (6) on the impact of Cloud services in the market. This study was sponsored by CA Technologies, New York, USA. The statistical data (given in Fig.4 & 5) has revealed the following facts.

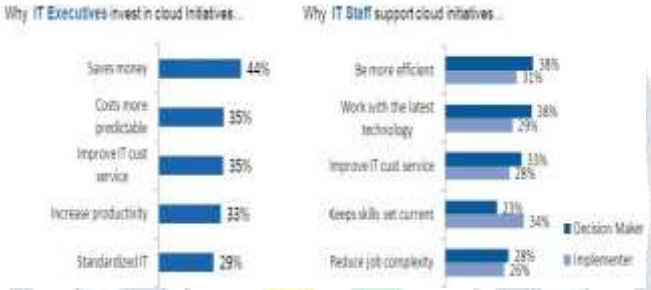

Fig. 4 IT personnel attitude towards the Cloud

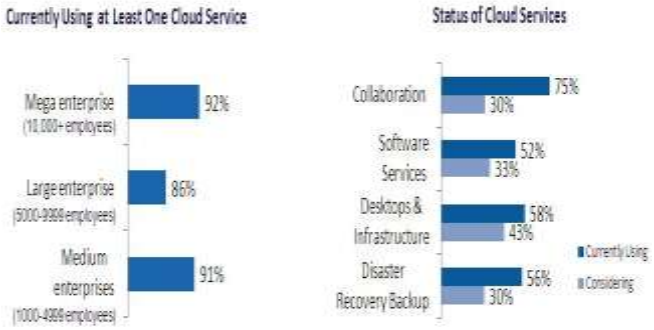

Fig. 5 Usage of Cloud services in the market

CLOUD COMPUTING OFFERS THE FOLLOWING ADVANTAGES TO THE ENTERPRISES:

- Lower costs: All resources, including expensive networking equipment, servers, IT personnel, etc. are shared, resulting in reduced costs, especially for small to mid-sized applications.

- Shifting Capital Expenses to Operational Expenses: Cloud computing enables companies to shift money from capital expenses to operating expenses, which ultimately allows the enterprise to focus their money and resources on innovation.

- Agility: Provisioning on-demand enables faster setup on an as-needed basis. When a project is funded, customer can initiate service, and then if the project is over, they can simply terminate the cloud contract.

- Scalability: Many cloud services can smoothly and efficiently scale to handle the growing nature of the business with a more cost effective pay-as-you-go model. This is also known as elasticity.

- Simplified maintenance: Patches and upgrades are rapidly deployed across the shared infrastructure, as well as the backups.

- Diverse platform support: Many cloud computing services offer built-in support for a rich collection of client platforms including browsers, mobile, and more. This diverse platform support enables applications to reach a broader category of users.

- Faster development: Cloud computing platforms provide many of the core services that, under traditional development models, would normally be built in house. These services, plus templates and other tools can significantly accelerate the development cycle.

- Large scale prototyping / Testing: Cloud computing makes large scale prototyping and load testing much easier. A client can easily spawn 1,000 servers in the cloud to load test your application and then release them as soon as they are done, and then try doing that with owned or corporate servers.

CLOUD STORAGE

Rapid data growth and the need to keep it safer and longer will require organizations to integrate how they manage and use their data, from creation to end of life. Now there is an opportunity to store all our data in the internet. Those off-site storages are provided and maintained by the third parties through the Internet which is represented in Fig. 6. Cloud storage offers a large pool of storage was available for use, with three significant attributes: access via Web services APIs on a non persistent network connection, immediate availability of very large quantities of storage, and pay for what you use. It supports rapid scalability .

EVOLUTION OF CLOUD STORAGE

Cloud storage is an offering of cloud computing. Fig. 7 shows the evolution of Cloud Storage based on traditional network storage and hosted storage. Benefit of cloud storage is the access of your data from anywhere. Cloud storage providers provide storage varying from small amount of data to even the entire warehouse of an organization. Subscriber can pay to the cloud storage provider for what they are using and how much they are transferring to the cloud storage.

Fig. 6 Simple cloud storage model

Basically the cloud storage subscriber copies the data into any one of the data server of the cloud storage provider. That copy of data will be made available to all the other data servers of the cloud storage provider featuring redundancy in the availability which ensures that the data of the subscriber is safe even anything goes wrong. Most systems store the same data on servers that use different power supplies.

BENEFITS OF CLOUD STORAGE:

- No need to invest any capital on storage devices.
- No need for technical expert to maintain the storage, backup, replication and importantly disaster management.
- Allowing others to access your data will result with collaborative working style instead of individual work.

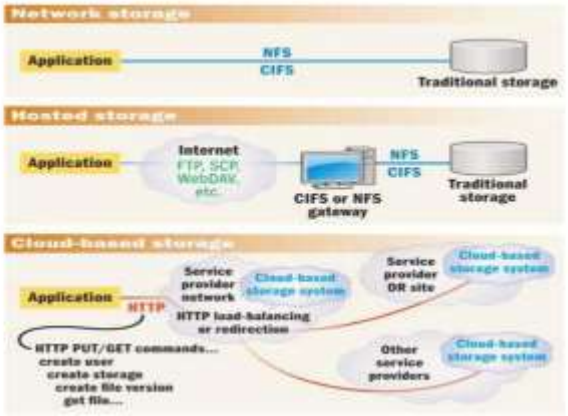

Fig. 7 Evolution of Cloud Storage

CLOUD STORAGE REFERENCE MODEL

The appeal of cloud storage is due to some of the same attributes that define other cloud services: pay as you go, the illusion of infinite capacity (elasticity), and the simplicity of use/management . It is therefore important that any interface for cloud storage support these attributes, while allowing for a multitude of business cases and offerings, long into the future.

The model created and published by the Storage Networking Industry Association (SNIA) shows multiple types of cloud data storage interfaces are able to support both legacy and new applications. All of the interfaces allow storage to be provided on demand, drawn from a pool of resources. The capacity is drawn from a pool of storage capacity provided by storage services. The data services are applied to individual data elements as determined by the data system metadata. Metadata specifies the data requirements on the basis of individual data elements or on groups of data elements (containers).

Cloud Data Management Interface is the functional interface which applications will be use to create, retrieve, delete and data elements from the cloud. As part of this interface the client will able to create the capabilities of the cloud storage offering and use this interface to manage containers and the data that is placed in them. In addition, metadata can be set on containers and their contained data elements through this interface. It is expected that the interface will be able to be implemented by the majority of existing cloud storage offerings today. This can be done with an adapter to their existing proprietary interface, or by implementing the interface directly. In addition, existing client libraries such as eXtensible Access Method (XAM) can be adapted to this interface as show in Fig. 8.

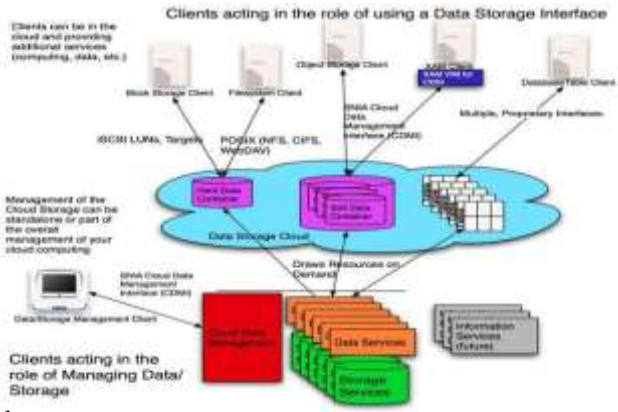

Fig. 8 Cloud Storage Reference model

CONCLUSION

Cloud storage strategies and service models which is in its early stages. Standardization of service providers service levels, pricing plan, data access methods, security processes, emergency plans for data migration if the enterprise sooner or later wish to change vendors, improving the performance by select better balancing methodology are some of the thrust areas where future works on cloud storage can be focused. Cloud computing is a favourable and emerging technology for the next generations of IT applications. Reducing data storage and processing cost is a mandatory requirement of any organization, while analysis of data and information is always the most important tasks in all the organizations for decision making. So no organizations and companies will transfer their data and information to the cloud until the trust is built between the cloud service providers and consumers. The number of techniques have been proposed by researcher people for data protection and attain highest level of data security in the cloud. However, there are still many gaps to be filled by making these techniques more effective. More work is required in the area of cloud computing which make it acceptable by the cloud service consumers. This paper select and search different techniques about data security and privacy, focusing on the data storage and use in the cloud, for data protecting in the cloud computing environments to build trust between cloud service providers and consumers.

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