Cloud Computing

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Abstract---Cloud computing refers to the use of multiple server based computational resources via Internet connection using the World Wide Web. Applications are provided and managed by cloud server. The data is stored remotely in the cloud configuration. Any computer or web device connected to the Internet may access the applications, files and computing power in a cloud computing environment. Data in cloud is centrally stored which does not need any storage medium like DVD or thumb drive. Desktop applications connected to the Internet provide email applications such as Gmail, Yahoo!, Hotmail etc.

Keywords:-Cloud Computing, Server based computing, Components of cloud, Advantages of cloud, Disadvantages of cloud computing, Applications of cloud computing, Movers in the cloud, Service using cloud, SaaS, PaaS, HaaS, IaaS

Fig. 1:

I. Challenges

Need to large scale data, high performance computing, automation, response time, rapid prototyping, rapid time production, Alignment with the needs of business or user or non-computer specialists or community or society, Cost, Real time information and immediate feedback

II. Introduction

Fig. 2:

Cloud computing is internet based computing in order to provide shared resources, software, and information to computer and other devices. The purpose behind cloud computing is to provide information anytime anywhere with higher efficiency and speedy distribution of services. Cloud computing is dynamic computing in which resources can be added or removed to fit the need. Cloud computing provides facility for lower cost, pay only for what you use. Multiple users can use the provided services and resources simultaneously. Cloud computing allows you to access applications that actually reside at a location other than your computer. Cloud computing can contains both redundant system as well as redundant physical sites. Redundant sites provide site failure coverage including power failure, earthquake and other disaster failures and connectivity failures. Cloud computing offerings Bare operating system, Web portal infrastructure, Applications, Web services, and Database services.

III. Components Of The Cloud Computing

A. Client Computers: Clients are classified into three following categories. They are Thin, Thick and Mobile. Thin clients are computers that do not provide internal hard drivers, server does all the work and then display the information. Thick clients are regular computers, they are using a web browser to connect to the cloud. Mobile client contains PDAs, Smartphone, Windows Mobile Smartphone or an iPhone. Among all these three clients, thin clients are in wide use because of their benefits and price. Thin clients provides lower hardware costs, lower IT costs, security, data security, less power consumption, ease of repair or replacement, less noise etc.

B. Data Center : The data center is the collection of servers. It can be a room that is full of servers on the other side the world access it via the Internet.

C. Distributed Servers : Distributed servers provide more flexibility and security. If cloud requires more hardware then according to that it will adjust more servers in a room and make them part of the cloud.

IV. Types Of Cloud Computing Models

The services in the cloud computing is to use reusable components across a network. Services in the cloud provides benefits of large scalability, Multitenancy which allows shared resources to the multiple users, device independence and low barriers to entry by making them available to small businesses.

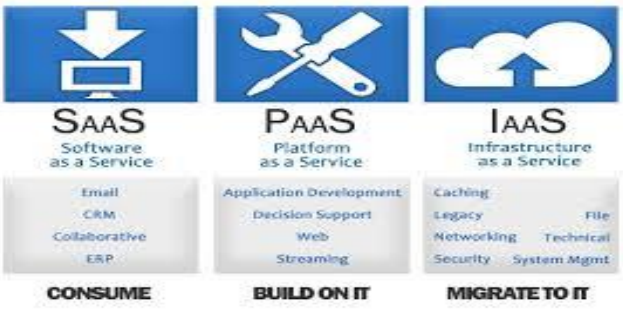

Fig. 3:

A. Software As A Service (Saas): Software as a service is the model in which an application is hosted as a service to

customers who access it via the Internet. Cost for accessing the software can be an ongoing thing. Sometimes it's not required to pay as much up front, only billed based on the usage of an application. Software that performs a simple task makes them ideal candidates for Software as a service. This model provides network based access to available software. Software is located at the center and customers can use their applications wherever they have web access. Applications of software as a service model include web analytics, web content management, IT service management, accounting, customer resource management, video conferencing. SaaS model provides commercial services such as Salesforce.com and email cloud.

Ex. Gmail, Google Apps, ZOHO Support, Wipro w-SaaS, Sales Force CRM, Financial Planning, Human Resources, Word processing etc.

1) Benefits: Better Marketing, Security, Smaller staff, Reliability, More Bandwidth, Pay per use, Instant Scalability, Security, Reliability, APIs

B. Platforms As A Service (Paas): Platforms as a service model provides resources which are required to build an applications and services from the Internet without install software. This model includes testing, development, design, deployment and hosting. The services include web service integration, database integration, security, storage, scalability and state management. This model is generally based on JavaScript or HTML. Platform as a service model is accessed by multiple users simultaneously, so it provides automatic facilities for concurrency management and security.

Ex. Google App Engine, Mosso, AWS: S3 etc.

C. Platforms As Services Found In Three Following Different Types Of Systems:

1) Add-On Development Facilities: Platforms as a service developers and users are required to purchase subscriptions to the add-on software as a service application.

2) *Stand-Alone Environments:* These are used for general developments, do not include technical as well as financial dependencies on software as a service model.

3) *Application Delivery-Only Environments:* These environments are for hosting level services like security, they don't include debugging and development.

4) Paas (Platforms As A Service) Layers Are :

- Cloud OS
- Cloud Middleware

5) Benefits: Pay per use, Reliability, Security, Instant Scalability, APIs:

D. Hardware As A Service (Haas) / Infrastructure As A Service (Iaas): Hardware as a service model do not provide applications to the customers, it only offers the hardware. Organization use it whenever they required it. This model allows rent resources like memory, CPU cycles, network equipment, server and storage space. Resources are billed based on a utility computing basis. This model contains network, internet connectivity, computer hardware, virtualization, service level agreements, utility computing billing.

Ex. Amazon's EC2, GoGrid, AppNexus, Flexiscale, AWS: EC2 etc.

E. Benefits: Pay per use, Reliability, Security, Instant Scalability, APIs

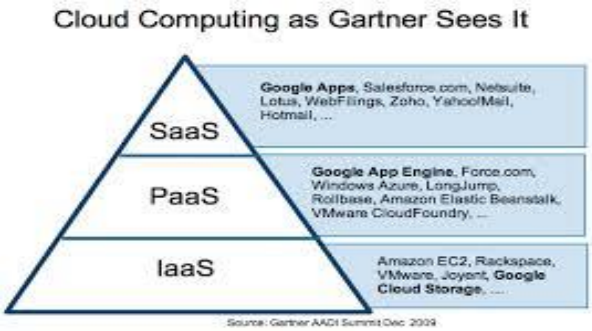

Fig. 4:

Public cloud is similar to renting a property rather than owning one. An organization could maintain a private cloud and private public both.

Common advantages of SaaS, PaaS and IaaS models

- Faster application rollout
- Lower cost of ownership
- Reduce infrastructure management responsibility
- Allow for unexpected resources loads

V. COMPARISIONS

Cloud computing shares characteristics with

- Client-Server model: Clients and Servers in distributed system distinguishes between service providers (servers) and service requesters (clients)
- Grid Computing**:** Combination of distributed computing and parallel computing in which super computer and virtual computer make a cluster of network
- Peer-to-peer: Distributed architecture without central coordination, with participants being at the same time both suppliers and consumers of resources
- Utility computing: Its packaging of computing resources such as computation and storage, services similar to a traditional public utility as electricity
- Mainframe computer: Large and powerful computers used by large organizations for critical applications
- Autonomic computing: The computer systems which are capable of self management.
- Service oriented computing: It provides service related computing which contains the computing techniques that operate on software as a service.

VI. MOVERS IN THE CLOUD

Table. 1:

Company	Platform	Year of Launch	Environment
Google	Google App. Engine	2008	Eclipse plug-in for GAE
Microsoft	Azure	2009	MS Visual Studio Azure development
Amazon	Amazon Web Services (AWS)	2006	Linux Machine Windows Machine A three-tier enterprise application
IBM	Blue Cloud Force.com	2008	

A. Application / Key Offering :

- Google: Web Application platform as a service, Interface is software programming based irrespective of the size.
- Microsoft: Application platform as a service (.Net, SQL data services)
- Amazon: Infrastructure as a storage computing, Datasets and content distribution. It can facilitate computations through Amazon Machine Images for various other models
- IBM: Proprietary 4GL Web application as a demand platform

B. Signature Features:

- Google: Templates and appspot, excellent monitoring and management console
- Microsoft: Web role, worker role, blob storage, table and drive-storage
- Amazon: S3, Map Reduce Cloud, Cloud Management Console, load balancing, Cloud monitoring tools, excellent distribution
- IBM: Self-service storage provisioning, Web-based access, Monitoring, Reporting and chargeback services, Service catalog, Capacity elasticity

VII. Services Using Cloud

Google Apps, Mendeley, Apple iPhone, iPad, Amazon Kindle, Dropbox, YouTube, e-science and e-business data deluge, Remotexs, Zimbara, Hadoop, multi-core, wireless and mobile, Facebook, Word365, Liblime Koha, Cybrarian

VIII. Advantages

Shared resources, Back up, Restoration, Flexibility, Mobility, Easy to install, Easy maintenance, Less cost

IX. Disadvantages

Data security, Data privacy, International, political and economic problems, Service unavailability due to power outage, Continuity of service, Dependence on outside agencies, Data migration problems when changing the cloud provider, Long term stability of service provider, Complexity, Standards

X. Conclusion

Cloud computing holds some strong promises such as high scalability, high availability, dynamic allocation of resources, and pay only for resources which you are using. But cloud computing is still not well understood and in infancy.

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