CLOUD COMPUTING-NEW VISION TO THE WORLD

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Abstract:

Cloud computing is an emerging paradigm for large scale infrastructures. It has the advantage of reducing cost by sharing computing and storage resources, combined with an on-demand provisioning mechanism relying on a pay-per-use business model. A cloud is a large pool of resources, unified through virtualization or job scheduling techniques, these resources can be managed to dynamically scale up to match the load, using a pay-per-resources business model. The resources include hardware and systems software on remote data centres, as well as services based upon these that are accessed through the Internet. Key features advertised are elasticity, multi-tenancy, maximal resource utilization and pay-per-use.

These new features provides the means to leverage large infrastructures like data centres, through virtualization or job management and resource management , but these large pools of resources are not necessarily located in the same country nor even on the same continent.

Cloud provides Platform as a Service (PaaS), Software as a Service (SaaS) and Infrastructure as a Service (IaaS). Basically cloud architecture contains three layers service provider, cloud provider and organization or end user. In market different cloud provider present today. We focus on cloud architecture, security issues in cloud and to solve them.

Keywords: Cloud, PaaS, SaaS, IaaS, Cloud Engineering, Cloud Security.

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I. INTRODUCTION:

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 network (Internet).Cloud computing is where an application doesn't access resources it requires directly, rather it accesses them through something like a service. So instead of talking to a specific hard drive for storage and a specific CPU for computation, etc. it talks to some service that provides these resources. The service then maps any requests for resources to its physical resources, in order to provide for the application. Usually the service has access to a large amount of physical resources, and can dynamically allocate them as they are needed.

A. HISTORY:

The cloud is metaphor for the internet, i.e. components which are managed by others. The term The Cloud was already in the commercial use around the turn of the 21st century. 2007 saw increased activity, including Google, IBM and a number of universities embarking on a large scale cloud computing research project. It was a hot topic by mid -2008 and numerous cloud computing events had been scheduled.

B. CLOUD ARCHITECTURE:

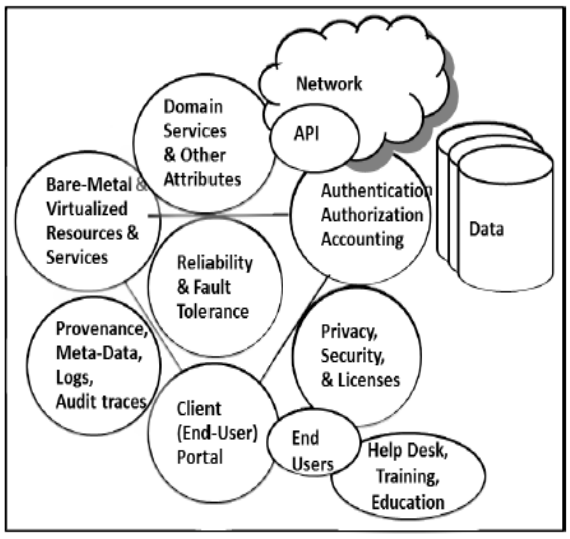

Figure 1: Cloud Computing Architecture

General high-level architecture of a cloud environment is illustrated in Fig. 1 Every cloud needs to support following:

a) Some type of bare-metal or virtual resources (computational, storage, networking),

b) Collection of provenance and other information about its operation, failures, data, etc.

c) One or more user and management interfaces,

d) Help desk and maintenance infrastructure,

e) Appropriate security, privacy, license management, etc,

f) Authentication, authorization, and accounting,

g) Domain specific service,

h) Communications via network and one or more API-s for access across network,

i) A data-bus (possibly multiple methods of access internal and external storage),

j) Appropriate fault-tolerance and reliability characteristics.

C. SOFTWARE AS A SERVICE (SAAS):

SaaS is a model of software deployment where an application is hosted as a service provided to customers across the Internet. Saas is generally used to refer to business software rather than consumer software, which falls under Web 2.0. By removing the need to install and run an application on a user's own computer it is seen as a way for businesses to get the same benefits as commercial software with smaller cost outlay. SaaS can alleviate the burden of software maintenance and support but users relinquish control over software versions and requirements. Other terms that are used in this sphere include Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

D. CLOUD ENGINEERING**:**

Cloud engineering is the application of engineering disciplines to cloud computing. It brings a systematic approach to the high level concerns of commercialization, standardization, 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.

The Intercloud is an interconnected global "cloud of clouds" and an extension of the Internet "network of networks" on which it is based.

II. DISCUSSION:

A. REAL WORLD EXAMPLES:

Many of the cloud specific vulnerabilities, the threats that might exploit them, and the risks associated with them have appeared as actual incidents.

1. Using IaaS to Host Crimeware

In its low level offering, cloud computing rents out storage space, processing cycles, and network components to consumers, allowing them to utilize them in whatever manner they wish within certain constraints. In the case of the certain cybercriminals, the cloud's IaaS was used as a platform to control a malicious botnet derived from the crime ware Zeus.

The Zeus crime ware toolkit is well established in the underground economy as being an easy to use and powerful tool for stealing personal data from remote systems. Based on the doit- yourself DIY model, the crime ware allows entry level hackers to create their own versions of botnets. Even though using an ISP might offer better anonymity, using a cloud can provide traffic camouflaging, where it would be harder to detect and blacklist harmful activity that is hiding in traffic disguised as a valid cloud service.

2. The Blue Pill Rootkit

This rootkit which is coined the "blue pill" creates a fake reality for an entire operating system and all of the applications running on it including antimalware sensors. The risk of such a program is that it could easily intercept all hardware requests from any software running on the system. The creators of the blue pill claim it to be completely undetectable, although some have disputed this claim [10].

Whether detectable or not, it would hard not to acknowledge that it demonstrates how exploits can be developed based on virtualization technologies.

3. Clouds Computing Outage and Data Loss

Leading providers of cloud computing services have suffered, and in some cases more than once, from data loss or suspension of service. The following are just a few examples of such incidents:

In 2009 Salesforce.com suffered an outage that locked more than 900,000 subscribers out of crucial CC applications and data needed to transact business with customers. Such an outage has even greater impact on companies with most of their operations conducted within the cloud.

B. DEVELOPMENT APPROACHES:

1. Public cloud:

In public cloud and external cloud resources are dynamically provisioned on a fine-grained, self-service basis over the internet, via web application/web services, from an off-site third–party provider who shares resource and bills on a fine–grained utility computing basis.

2. Community cloud:

Typically cloud systems are restricted to the local infrastructure, i.e. providers of public clouds offer their own infrastructure to customers. Though the provider cloud actually resell the infrastructure of another provider, cloud do not aggregate infrastructure to build up larger, cross-boundary structures. In particular smaller SMEs cloud profit from community clouds to which different entities contribute with their respective smaller infrastructure. Community clouds can either aggregate public clouds or dedicated resource infrastructure.

3. Hybrid cloud:

Hybrid clouds consist of mixed employment of private and public cloud infrastructure so as to achieve the maximum of cost reduction through outsourcing whilst maintaining desired degree of control over e.g. sensitive data by employing local private clouds.

4. Private cloud:

Private cloud and internal cloud claim to "deliver some benefits of cloud computing without the pitfalls", capitalizing on data security, corporate governance, and reliability concerns. They have been criticized on the basis that users "still have to buy, build, and mange them and as such do not benefit from lower up- front capital costs and less hands-on management, essentially".

5. Special purpose cloud:

Special purpose clouds are just extensions of "normal" cloud system to provide additional, dedicated capabilities. The basis of such development is already visible. E.g. "Google App Engine".

C. CLOUD PROVIDERS:

Offer clouds to the customer – either via dedicated APIs (PaaS), virtual machines and / or direct access to the resources (IaaS). The hosts of cloud enhanced services (SaaS) are typically referred to as Service Providers, though there may be ambiguity between the terms Service Provider and Cloud Provider.

E.g. Google, Wso2, Amazon, Nebula

D. CHARACTERISTICS OF CLOUD COMPUTING:

1. High scalability

Cloud environments enable servicing of business requirements for larger audiences, through high scalability.

2. Agility

The cloud works in the 'distributed mode' environment. It shares resources among users and tasks, while improving efficiency and agility.

3. High availability and reliability

Availability of servers is high and more reliable as the chances of infrastructure failure are minimal.

4. Multi-sharing

With the cloud working in a distributed and shared mode, multiple users and applications can work more efficiently with cost reductions by sharing common infrastructure.

5. Services in pay-per-use mode

SLAs between the provider and the user must be defined when offering services in pay per use mode. This may be based on the complexity of services offered

6. Application Programming Interfaces

(APIs) may be offered to the users so they can access services on the cloud by using these APIs.

7. Support for all service oriented applications

E. CHARACTERISTIC CLOUD COMPUTING GRID COMPUTING:

TABLE I. CLOUD COMPUTING VS. GRID COMPUTING CHARACTERISTICS

Service oriented	Yes	Yes
Loose coupling	Yes	Half
Strong fault tolerant	Yes	Half
Business model	Yes	No
Ease use	Yes	Half
TCP/IP based	Yes	Half
High security	Half	Half
Virtualization	Yes	Half

F. APPLICATIONS:

We describe three applications built on Orleans to illustrate the flexibility of its architecture and programming model. The applications differ in the way they use the system. The first application is a Twitter1-like messaging application, which is communication-intensive with little data or computation. The second application is a linear algebra library for large sparse matrix computations, which is Computation, communication, and IO- intensive. The third is a distributed engine for querying and processing large graphs, which is data-intensive. The applications differ significantly in the size and number of grains and types of interactions between the grains.

1. Chirper:

Chirper is a large-scale Twitter-like publish-subscribe system for distributing small text message updates within a large network of consumers / subscribers. It allows a user to create an account, follow other users, and receive messages posted by them on their account. We built Chirper in 200 lines of Orleans C# code. It includes only the core functionality of subscribing to a publisher and publishing and receiving messages. It does not include authentication and security, archival

message storage, or message searching and filtering. Replication, persistence, and fault tolerance, however, are managed automatically by Orleans.

2. Linear Algebra Library:

Linear algebra is a broad area that comprises general-purpose computations on scalars, vectors, and matrices (including higher dimensions as tensors). The core of a linear algebra library is the vector-matrix multiplication operation. This operation is the basis for many algorithms, including Page Rank, singular value decomposition, clustering, feature extraction, and social group discovery (partitioning). Conceptually, vector-matrix multiply is quite simple, and an implementation can be written very efficiently if the data set can be held in memory on one machine. As the data size grows, distributing the computation and maintaining efficiency becomes difficult due to the complexity and limitations of data placement, disk access, network bandwidth and topology, and memory limitations.

3. Large Graph Engine:

Graphs are central to web search, social networking, and other web applications. Large graphs pose many challenges, as they do not fit a single computer and distributed algorithms are communications intensive [8]. Our graph engine provides support for partitioning and distributing graph data (nodes, edges, and metadata) across many machines and for querying graphs. In contrast to the linear algebra library, where data is represented by a numerical matrix, the graph engine supports rich node and edge data types with user-defined properties and metadata, similar to database rows.

G. SECURITY THREATS:-

The security of cloud computing services is a contentious issue that may be delaying its adoption. Issues barring the adoption of cloud computing are due in large part to the private and public sectors' unease surrounding the external management of security-based services. It is the very nature of cloud computing-based services, private or public, that promote external management of provided services. This delivers great incentive to cloud computing service providers to prioritize building and maintaining strong management of secure services.

Security issues have been categorized into sensitive data access, data segregation, privacy, bug exploitation, recovery, accountability, malicious insiders, management console security, account

control, and multi-tenancy issues. Solutions to various cloud security issues vary, from cryptography, particularly public key infrastructure (PKI), to use of multiple cloud providers, standardization of APIs, and improving virtual machine support and legal support.

III. CONCLUSION:

After so many years, Cloud Computing today is the beginning of "network based computing" over Internet in force. It is the technology of the decade and is the enabling element of two totally new computing models, the Client-Cloud computing and the Terminal-Cloud computing.

These new models would create whole generations of applications and business. Our prediction is that it is the beginning to the end of the dominance of desktop computing such as that with the Windows. It is also the beginning of a new Internet based service economy: the Internet centric, Web based, on demand, Cloud applications and computing economy.

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