ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
Available online at www.ijarbest.com

International Journal of Advanced Research in Biology Ecology Science and Technology (IJARBEST)
Vol. I, Special Issue I, August 2015 in association with VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERING COLLEGE, CHENNAI
National Conference on Recent Technologies for Sustainable Development 2015 [RECHZIG'15] - 28th August 2015

Virtualization in Cloud Computing

[1]R.ADITI, [2]S.BHARGHAVI
[1,2]Third Year, [1,2]Department of Information Technology
[1,2]Sri Sairam Engineering College

ABSTRACT

Cloud Computing is emerging fastly and no doubt it is the next generation technology where humans will be using anywhere and anytime. In this internet world cloud computing is raising high by providing everything incense the required resources, applications, software, hardware, computing power to computing infrastructure, business process to control collaboration. Today clouds with virtualization are transforming IT. Apart of its popularity it has some concerns which are becoming huddles for its wider adoption. In this paper a study has been made on virtualization concerns.

Keywords: cloud computing, security in clouds, network security, Virtualization, Effects of virtualization

INTRODUCTION

Cloud computing is becoming popular as virtualization power, distributed computing with server clusterand increase in the availability of broadband internet assessing is increasing.The IT world is looking forward for the services provided by cloud computing thus boosting up thedevelopment of cloud computing.

NIST [1] has defined cloud as "Cloud computing is a model for enabling ubiquitous, convenient, ondemand 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".

According to 2013 future of cloud computing survey reveals that cloud adoption continued to raise in 2013, with 75 percent of those surveyed reporting the use of some sort of cloud platform up from 67 percent last year. That growth is consistent with forecasts from GigaOM Research, which expects the total worldwide addressable market for cloud computing to reach $158.8B by 2014, an increase of 126.5 percent from 2011.

This paper is organized as follows Section-II defines cloud computing, Section-III describes the components and services of cloud computing, Section-IV gives the deployment models of clouds, Section-V gives the Virtualization issues in clouds and finally section-VI provides Conclusions.

DEFINETION OF CLOUD COMPUTING

Cloud computing is the outcome of grid computing, utility computing and automatic computing. Cloud is a parallel and distributed computing system which consists a set of inter connected and virtualized computers which gives one or more unified computing resources based on the requirements between service providers and service consumers[4].

Cloud computing is on demand pay-as-use i.e billing is done based on the usage of the customer which downs the operational and capital cost. Users can access applications which are present outside the working site which can access remote applications through internet connection devices. By this, computer resources can be efficiently used and consume less computing power and resources are shared cooperatively.

Cloud computing services are first offered by Amazon, Google, Microsoft and now many are existing. These services are used by software industries, government sectors, and health care sectors and in many more fields.

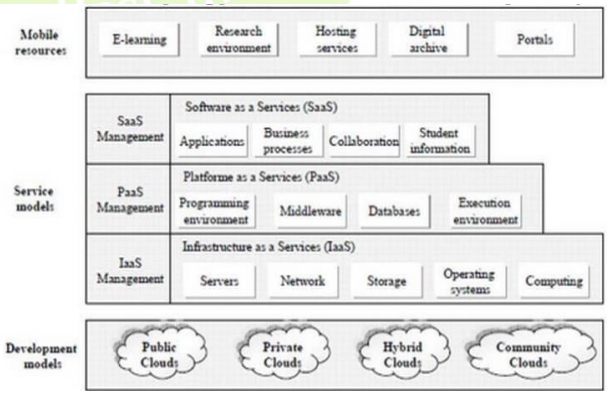

Fig1:Architecture of cloud

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
Available online at www.ijarbest.com
International Journal of Advanced Research in Biology Ecology Science and Technology (IJARBEST)
Vol. I, Special Issue I, August 2015 in association with VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERING COLLEGE, CHENNAI
National Conference on Recent Technologies for Sustainable Development 2015 [RECHZIG'15] - 28th August 2015

The main power of cloud computing lies in the way data is stored, how it is transmitted and accessed. A virtualized platform with management capabilities like availability, automated load balancing and fault tolerance reduces infrastructure cost and maintenance cost.

COMPONENTS OF CLOUD COMPUTING

Cloud computing has clients, data centers, distributed servers as the components.

Clients: Users like computers, laptops, tablets computers mobile phones or PDA's.
Data Centers: These are a collection of servers where the application is hosted. Virtualization is done where multiple instances of virtual servers are created.
Distributed Server: Servers which reside non locally which are geographically far.

The main objective of cloud computing is to offer computing power, storage and software "as a service". By the help of services in cloud computing offers usability, fine grained components. Services offer scalability, multi tenancy and device independence. There are three typed of cloud services.

Saas: Software as a Service is the model in which an application is hosted as a service to customers who access through internet. Users can access their application anywhere if they are connected to internet.
Some of the applications are CRM (customer Resource Managing), accounting, web content managing.

The main advantage of SaaS is that

- Users can get software with less money than buying and installing it.
- It offers web reliability, as the web is reliable the applications that are running are more reliable.
- Security is ensured as it uses SSL (secure socket layer).

PaaS: Platform as a Service. This is another application delivery model which provides resources required to build application and services completely from internet without purchasing.

Developers can design, develop, test and deploy and host applications. More services are like team collaboration, web service integration, DB integration.

The main advantage of Paas is that

- Paas provides greater flexibility, speed and agility to the development process.
- It provides a predictable, heterogeneous application infrastructure.
- It reduces server storage overhead.

IaaS: Infrastructure as a service. This provides the required hardware so that users can put anything they required. Iaas allows renting of resources like server space, cpu cycles, network equipments, memory and storage space.

The main advantages of Iaas are

- Infrastructure can be dynamically scaled up or down based on the requirement.
- Virtualization as service which allows clients to run the virtual machines.
- Network as a service which includes hardware for firewalls, routers and load balancing.

Through these services cloud computing get's the application a way of viewing, manipulating and sharing data. Cloud computing has many benefits like scalability, storage, simplicity, knowledgeable vendors and many resource providers. Apart of these clouds have its limitations like security of sensitive data storage, security in transferring data, privacy issues with the third party.

CLOUD DEPLOYMENT MODELS

In the cloud computing deployment model services like software and hardware infrastructure, networking, storage are provided to the clients. Cloud has three working models

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
Available online at www.ijarbest.com
International Journal of Advanced Research in Biology Ecology Science and Technology (IJARBEST)
Vol. I, Special Issue I, August 2015 in association with VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERING COLLEGE, CHENNAI
National Conference on Recent Technologies for Sustainable Development 2015 [RECHZIG'15] - 28th August 2015

Fig2:Types of clouds

Public cloud: A public cloud is owned by the Cloud provider and are open for public use[7]. The infrastructure is provided to many clients and is managed by the third party. Users can simultaneously access the application equally. The main feature of public cloud is multi tenancy more than one user can access any where any time through internet. Example of a public cloud is Amazon EC2 (Amazon Elastic Compute Cloud) Amazon EC2 provides the following features[11]:

- Virtual computing environments, called as *instances*
- Pre-configured templates for instances, known as *Amazon Machine Images (AMIs)*, that package the bits need for clients server (including the operating system and additional software)
- Various configurations of CPU, memory, storage, and networking capacity for known as *instance types*
- Secure login information for instances using *key pairs* (AWS stores the public key, and clients store the private key in a secure place)
- Storage volumes for temporary data that's deleted when client stops or terminates instance, known as *instance store volumes*
- Persistent storage volumes for users data using Amazon Elastic Block Store (Amazon EBS), known as *Amazon EBS volumes*
- Multiple physical locations for users resources, such as instances and Amazon EBS volumes, known as *regions* and *Availability Zones*
- A firewall that enables users to specify the protocols, ports, and source IP ranges that can reach user instances using *security groups*
- Static IP addresses for dynamic cloud computing, known as *Elastic IP addresses*
- Metadata, known as *tags*, that user can create and assign to Amazon EC2 resources
- Virtual networks user can create that are logically isolated from the rest of the AWS cloud, and that can optionally connect to users network, known as *virtual private clouds* (VPCs)

Private cloud: The services and infrastructure made available to a specific customer, which is owned and manage by the organization. In private hardware and software sharing is limited and security is provided by encryption. It is setup with organization's internal enterprise datacenter.

One of the examples of private cloud is introduction of cloud educational projects in Northern Ireland. Where billing of resources is done smoothly through cloud. That's the approach being adopted by C2k, the organization established to help schools in Northern Ireland get the best for teaching and learning from education technology.

One of the largest and most comprehensive educational ICT initiatives in the UK, C2k provides schools in Northern Ireland with a comprehensive managed ICT service. The service includes a LAN in each school with access to a Northern Ireland WAN, administration and management systems for schools, access to the Learning NI managed learning environment (including filtered access to the internet and e-mail), the Virtual Classroom secure videoconferencing system and full service support.

The private cloud model is closer to the more traditional model of individual local access networks (LANs) used in the past by enterprise but with the added advantages of virtualization.

Hybrid cloud: A hybrid cloud is an integrated cloud service utilizing both private and public clouds to perform various functions within the same organization. Public cloud services are more cost effective and scalable than private clouds[8]. Therefore, an organization can maximize their efficiencies by employing public cloud services for all non-sensitive operations, only relying on a private cloud where they require it and ensuring that all of their platforms are seamlessly integrated.

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
Available online at www.ijarbest.com
International Journal of Advanced Research in Biology Ecology Science and Technology (IJARBEST)
Vol. I, Special Issue I, August 2015 in association with VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERING COLLEGE, CHENNAI
National Conference on Recent Technologies for Sustainable Development 2015 [RECHZIG'15] - 28th August 2015

Hybrid cloud models can be implemented in a number of ways:

- Separate cloud providers team up to provide both private and public services as an integrated service •Individual cloud providers offer a complete hybrid package
- Organizations who manage their private clouds themselves sign up to a public cloud service which they then integrate into their infrastructure.

In practice, an enterprise could implement hybrid cloud hosting to host their e-commerce website within a private cloud, where it is secure and scalable, but their brochure site in a public cloud, where it is more cost effective (and security is less of a concern). Alternatively, an Infrastructure as a Service (IaaS) offering, for example, could follow the hybrid cloud model and provide a financial business with storage for client data within a private cloud, but then allow collaboration on project planning documents in the public cloud - where they can be accessed by multiple users from any convenient location.

A hybrid cloud configuration, such as hybrid hosting, can offer its users the following features:

- Scalability: Public and private cloud services offers scalability but with boundaries because resource is pulled from the larger cloud infrastructure.
- Security: The private cloud component not only provides needed security for sensitive operations but also satisfy regulatory requirements for data handling and storage.
- Flexibility**:** The hybrid cloud provides flexibility of both secure and scalable cost effective public resource.
- Cover Legacy Gaps**:** hybrid model fills the gap between old and new systems.
- Cut Energy Costs: Data and technology standards can be maintained at lower cost.

VIRTUALIZATION IN CLOUD COMPUTING

virtualization in computing is creation of virtual (not real) of virtual something such as hardware, software, platform or a operating system or a storage or a network device[8]. In a virtualized environment IT enterprise has to manage many changes as the changes occur more quickly in virtual environment than in a physical environment. Because of virtualization clouds are scalable and agile.

Even though cloud computing can exists without virtualization it may be inefficient and difficult. As cloud computing tags with "pay-as-use" and "infinite" availability these are mainly virtualization theme.

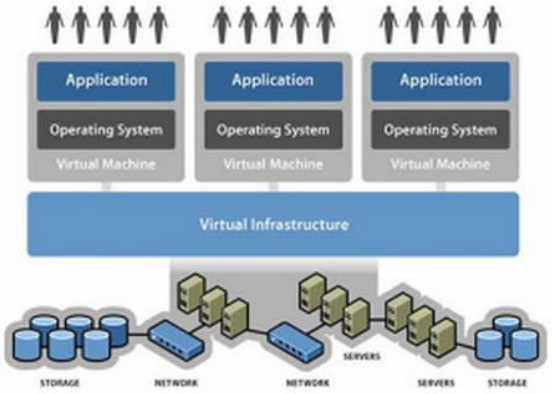

fig3: Virtualization mechanism

Advantages of virtualization in cloud computing

Virtualization technology makes cloud computing environment easily to manage the resources. It abstracts and isolates the underlying hardware, and networking resources in a single hosting environment.

It increases the security of cloud computing by protecting both the integrity on guest virtual machine and cloud components virtualized machines can be scaled up or down on demand and can provide reliability. It provides resource sharing, high utilization of pooled resources, rapid provisioning, workload isolation.

The recent trends in virtualization are consolidation of data centers thus reducing the managing cost.

Apart of its benefits it has some drawbacks like managing virtual resources is critical and migrating services of these resources are difficult in achieving high availability.

If one server fail VM will be restarted on the other virtualized server in resource pool restoring the required services with minimum service interruption.

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
Available online at www.ijarbest.com
International Journal of Advanced Research in Biology Ecology Science and Technology (IJARBEST)
Vol. I, Special Issue I, August 2015 in association with VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERING COLLEGE, CHENNAI
National Conference on Recent Technologies for Sustainable Development 2015 [RECHZIG'15] - 28th August 2015

Virtual resources are critical for managing and data monitoring. Running applications with high utilization and availability is a challenging issue.

Hypervisor: A hypervisor is a software, hardware or a firmware that provides virtual partitioning capabilities which runs directly on hardware. It is defined as the virtual machine manager which allows multiple operating systems to run on a system at a time providing resources to each OS without any interaction.

Hypervisor controls all the guest systems. As the operating system number increases managing is difficult these leads to security issues. If a hacker gets control over the hypervisor he can control the guest systems by knowing the behavior of the system which causes data processing damage. Advanced protection system is to be developed to monitor the activities of the guest Virtual machine[9].

CONCLUSION

To have physical and virtual controls in the cloud environment one must protect data by implementing strong encrypting techniques using secure connections and applying data loss prevention policies[12].

Access control policies are to be established and client identities are to be checked.

Datacenter platforms, infrastructure and client devices are to be secured by trusted computer policies.

Enable secure migration from private cloud environment to public cloud providers.

REFERENCES

[1]Peter Mell, Timothy Grance, "The NIST Definition of Cloud Computing", Jan, 2011. http://docs.ismgcorp.com/files/external/Draft-SP-800-145 Cloud Definition.pdf

[2]"Secure virtualization for cloud computing".Flavio Lombardi, Roberto Di Pietro, June 2010

[3] www.fobes.com/cloud computing.

[4] Lizhe Wang, Jie Tao, Kunze M., Castellanos A.C., Kramer D., Karl W., "Scientific Cloud Computing: Early Definition and Experience", 10th IEEE Int. Conference on High Performance Computing and Communications, pp. 825-830, Dalian, China, Sep.2008, ISBN: 978-0-7695-3352-0.

[5] R. L. Grossman, "The Case for Cloud Computing", IT Professional, vol. 11(2), pp. 23-27, Mar-April, 2009 ISSN:1520-9202, INSPEC Accession Number: 10518970, DOI: 10.1109/MITP.2009.40.

[6] Lizhe Wang, Jie Tao, Kunze M., Castellanos A.C., Kramer D., Karl W., "Scientific Cloud Computing: Early Definition and Experience", 10th IEEE Int. Conference on High Performance Computing and Communications, pp. 825-830, Dalian, China, Sep.2008, ISBN: 978-0-7695-3352-0.T.Swathi et al, International Journal of Computer Science and Mobile Computing, Vol.3 Issue.5, May- 2014, pg. 540-546 © 2014, IJCSMC All Rights Reserved 546

[7] Wayne Jansen, Timothy Grance, "NIST Guidelines on Security and Privacy in Public Cloud Computing", Draft Special Publication 800-144,2011. http://csrc.nist.gov/publications/drafts/800-144/Draft-SP-800-144_cloud-computing.pdf.

[8] Michael Kretzschmar, S Hanigk, "Security management interoperability challenges for collaborative clouds", Systems and Virtualization Management (SVM), 2010, Proceedings of the 4th International DMTF Academic Alliance Workshop on Systems and Virtualization Management: Standards and the Cloud, pp. 43-49, October 25-29, 2010. ISBN:978-1-4244-9181-0,DOI: 10.1109/SVM.2010.5674744.

[9] FarzadSabahi, "Secure Virtualization for Cloud Environment Using Hypervisor-based Technology", Int. Journal of Machine Learning and Computing, pp.39-45, vol. 2, no. 1, February, 2012.

[10] K. Hwang, S Kulkarni and Y. Hu, "Cloud security with virtualized defence and Reputation-based Trust management", Proceedings of 2009 Eighth IEEE International Conference on Dependable, Autonomic and Secure Computing (security in cloud computing), pp. 621-628, Chengdu, China, December, 2009. ISBN:978-0-7695-3929-4.

[11] "Amazon Web Services: Overview of Security Processes", Whitepaper, May, 2011.

ISSN 2395-695X (Print)
ISSN 2395-695X (Online)
Available online at www.ijarbest.com
International Journal of Advanced Research in Biology Ecology Science and Technology (IJARBEST)
Vol. I, Special Issue I, August 2015 in association with VEL TECH HIGH TECH DR. RANGARAJAN DR. SAKUNTHALA ENGINEERING COLLEGE, CHENNAI
National Conference on Recent Technologies for Sustainable Development 2015 [RECHZIG'15] - 28th August 2015

http://d36cz9buwru1tt.cloudfront.net/pdf/AWS_Se curi ty_Whitepaper.pdf

[12] Security for Virtual Machines in Cloud Computing",5th Int'l Conference on Computer Sciences and Convergence Information Technology, pp. 18-21, Seoul, Nov. 30-Dec. 2, 2010. ISBN: 978-1-4244-8567-3.