Implementation of SaaS in a Cloud Computing Environment

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Abstract– **Cloud computing is 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. Cloud computing resources can be accessed from any computer on the Internet. It is, however, does not just mean any computer, but any kind of computer. Clouds provide processing power, which is made possible through distributed computing. Cloud computing can be seen as a traditional desktop computing model, where the resources of a single desktop or computer used to complete tasks, and an expansion of the client/server model. The paper describes a model for implementing the software as a service (SaaS) in a cloud model.**

Index Terms– **Cloud, Virtual, SaaS, PaaS, IaaS and Virtualization**

I. INTRODUCTION

IN Cloud Computing [1] the delivery models include SaaS (Software as a Service) [1], PaaS (Platform as a service) [1], IaaS (Infrastructure as a service) [1] etc. We can simplify this structure to represent it in a diagram as shown in Fig. 1:

A. SaaS (Software as a service)

Software as a service (SaaS) is a way of delivering applications over the Internet- as a service [3]. Instead of installing and maintaining software, you simply access it via the Internet, freeing yourself from complex software and hardware management. The consumer uses an application, but does not control the operating system, hardware or network infrastructure on which it's running. SaaS applications are sometimes called Web-based software, on-demand software, or hosted software. For Software as a Service, open standards apply at the application level.

For example, a cloud-based word processing application [5] should support standards for document portability; the requirement for standards support in a word processing application has nothing to do with whether the application is running in the cloud. Whatever the name, SaaS applications run on a SaaS provider's servers. The provider manages access to the application, including security, availability, and performance. SaaS customers have no hardware or software to

buy, install, maintain, or update. Access to applications is easy: you just need an Internet connection. This type of cloud computing [11] delivers a single application through the browser to thousands of customers using a multitenant architecture. On the customer side [4], it means no upfront investment in servers or software licensing; on the provider side, with just one app to maintain, costs are low compared to conventional hosting. Below the diagram displays the basic high-level layout of the cloud computing, where the provider would create their solution (software, infrastructure or platform) on the internet and one or more users can consume that service "on demand".

B. PaaS (Platform as a Service)

PaaS is a combination of a development platform and a solution stack, delivered as a service on demand. It provides infrastructure on which software developers can build new applications or extend existing ones without the cost and
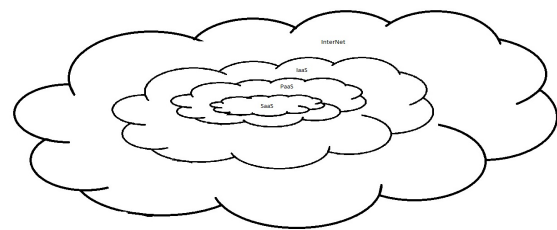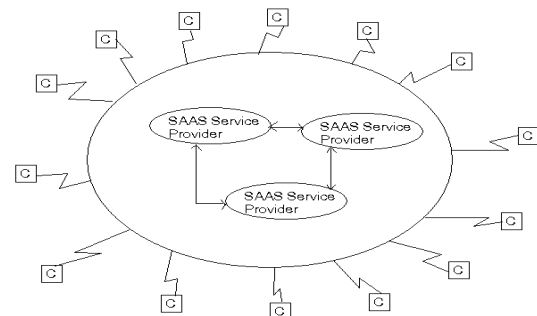

Fig. 1. Cloud Services

Fig. 2. SaaS Connectivity

complexity of buying and managing the underlying hardware and software and provisioning hosting capabilities [2]. The consumer uses a hosting environment for their applications. The consumer controls the applications that run in the environment (and possibly has some control over the hosting environment), but does not control the operating system, hardware or network infrastructure on which they are running. The platform is typically an application framework [12]. Those frameworks typically provide common services such as user interfaces, storage and databases, but they are accessible only through the APIs of the framework. In other words, it provides the supporting infrastructure to enable the end user develop his own solutions.

C. IaaS (Infrastructure as a Service)

Infrastructure as a Service (IaaS) is delivery of the computing infrastructure as a fully outsourced service. Managed hosting and development environments are the services included in IaaS. The consumer can control the operating system, storage, deployed applications and possibly networking components such as firewalls and load balancers, but not the cloud infrastructure beneath them. For infrastructure as a Service, the provider maintains the storage, database, message queue or other middleware, or the hosting environment for virtual machines. The consumer uses that service as if it was a disk drive, database, message queue, or machine, but they cannot access the infrastructure that hosts it. Users should be able to take a VM built and deployed with one cloud provider and deploy it to another cloud provider without changes.

The user can buy the infrastructure according to the requirements at any particular point of time instead of buying the infrastructure that might not be used for months. IaaS operates on a "Pay as you go" model ensuring that the users pay for only what they are using. Virtualization enables IaaS providers to offer almost unlimited instances of servers to customers and make cost-effective use of the hosting hardware. IaaS users enjoy access to resources that might be very costly if purchased completely. Thus dynamic scaling, usage based pricing, reduced costs and access to superior IT resources are some of the benefits of IaaS. IaaS is also sometimes referred to as Hardware as a Service (HaaS). For a startup or small business, one of the most difficult things to do is keep capital expenditures under control. By moving your infrastructure to the cloud, you have the ability to scale as if you owned your own hardware and data center.

II.   TYPES OF CLOUD COMPUTING

A. Public Cloud

Public cloud or external cloud describes cloud computing in the traditional mainstream sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the Internet via web applications/web services, from an off-site third-party provider who shares resources and bills on a fine-grained utility computing basis. The term "public" does not always mean free, even though it can be free or fairly inexpensive to use. Public clouds provide an elastic, cost effective means to deploy solutions.
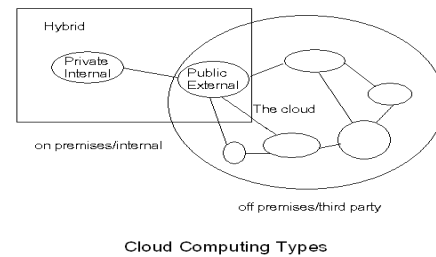

Fig. 3. Cloud Deployment Models

B. Private Cloud

A private cloud offers many of the benefits of a public cloud computing environment, such as being elastic and service based. The difference between a private cloud and a public cloud is that in a private cloud-based service, data and processes are managed within the organization without the restrictions of network bandwidth, security exposures and legal requirements that using public cloud services might entail. In addition, private cloud services offer the provider and the user greater control of the cloud infrastructure, improving security and resiliency because user access and the networks used are restricted and designated. Advances in virtualization and distributed computing have allowed corporate network and datacenter administrators to effectively become service providers that meet the needs of their "customers" within the corporation.

C. Hybrid Cloud

It is a cloud computing environment in which an organization provides and manages some resources in-house and has others provided externally. For example, an organization might use a public cloud service, such as Amazon's Elastic Compute Cloud (EC2) for general computing but store customer data within its own data center. A hybrid cloud is a combination of a public and private cloud that interoperates. In this model users typically outsource nonbusiness critical information and processing to the public cloud, while keeping business-critical services and data in their control. A hybrid cloud can be delivered by a federated cloud provider that combines its own resources with those of other providers. A broker can also deliver a hybrid cloud; the difference is that a broker does not have any cloud resources of its own. Although cloud computing is often said to be the future of the industry, the hybrid model is more prevalent for a number of reasons. Large enterprises often already have substantial investments in the infrastructure required to provide resources in-house. Furthermore, many organizations would prefer to keep sensitive data under their own control to ensure security.

III.   CLOUD ARCHITECTURE

The Cloud Computing Architecture of a cloud solution is the structure of the system, which comprises on-premise and cloud resources, services, middleware, and software components, geo-location, the externally visible properties of those, and the relationships between them. The term also
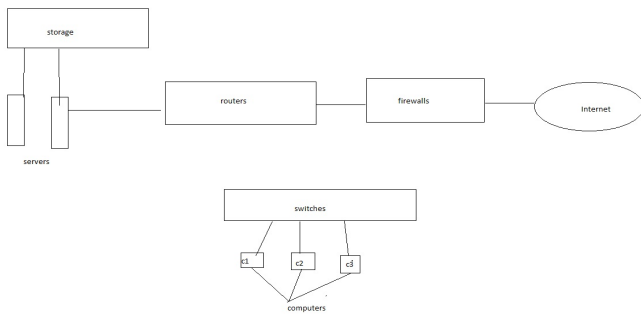
Fig. 4. Cloud Access

refers to documentation of a system's cloud computing architecture. Cloud Computing Architecture[10] aspects will be integrated in Cloud platforms as framework, process, templates, guidance to lower the business, legal, and technical burden for application developers. As clouding computing defines the combination of network Infrastructure, Virtualization and cloud computing platform or sharing of resources over the Internet.

A. Virtualization

The ability to run multiple operating systems on a single physical system and share the underlying hardware resources. Virtualization is a key enabling technology for cloud computing environments [6]. It provides the flexibility, agility and scalability needed for a computing component to adapt to the varying demands of its heterogeneous user base. It will not exit but functions by creating virtual version of an IT resource such as OS, a server, Storage Device and Network Resource.

B. Methods

1) Server Virtualization: Server Virtualization is the masking of server resources including the number and the identity of individual physical servers, processors and operating systems from server uses. The server Administrator uses a software application to divide one physical server into multiple isolated virtual environments. The virtual environments [7] sometimes called virtual private servers but they are also known as guest, instance, containers or emulations.

2) Application Virtualization: Application virtualization is an umbrella term that describes software technologies that improve probability, manageability and compatibility of
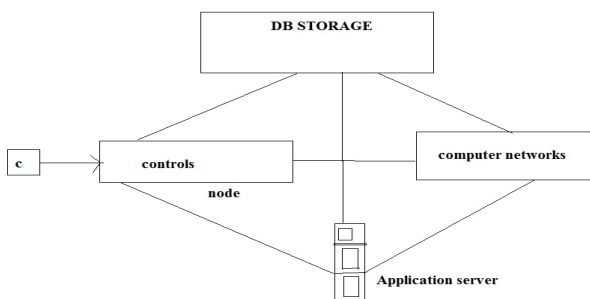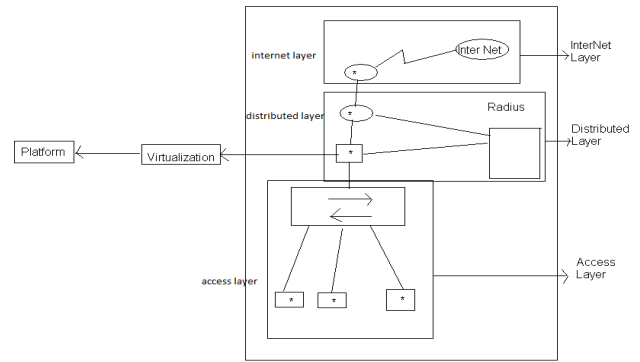

Fig. 5. Cloud Virtualization

Fig. 6. Deployment Process

applications by encapsulating them from the underlying operating system on which they are executed. A fully virtualized application is not installed in the traditional sense, although it is still executed as if it were. The application is fooled at runtime into believing that is directly interfacing with the original operating system and all the resources managed by it, when in reality it is not.

3) Infrastructure Virtualization: The technology that eventually became infrastructure virtualization began in the mid -1960's. At its onset virtualization had two main goals, the creation of a "virtual memory" and a "machine emulator" that was able to run software designed for other computer platforms [8]. While several companies achieved these goals, the results were mixed and virtualization research continued.

C. Deployment Process

The deployment process comprises of three methods: Core layer: consists of internet-(CISCO, RTD). Distributed layer: consists of RADIUS and TAC ACT. Access layer: consists of switches.

IV. IMPLEMENTATION & OBSERVATIONS

Creating a new virtual machine runs UBUNTU [9] in VMware Player 3.0 is a very straightforward process. Simply click Create a New Virtual Machine to start with. And then indicates where the installation media is located, either from DVD-Rom, or an ISO image file. We started investigation from an ISO file. The Virtual machine hard disc is stored as one or more files in host computers physically. These files could start as smaller ones and become large as you add applications, data and files to the virtual machine. Here we have consisdered the Maximum disk size is 20 GB. Another prime area focused on specifying the amount of memory allocated to the virtual machine.The memory size must be multiple of 4MB.

The recommended memory for virtual machine is 512MB. For guest OS recommended memory is 256MB, once we click the power on this Virtual machine button the newly created virtual machine Will automatically boot up. To enter into the ubuntu it will ask for the username and a password for security. After entering the username and password, virtual machine that runs the ubuntu ready.Next we can get the ubuntu window with another window, windows will automatically run in the backside. The Fig. 9 shows the
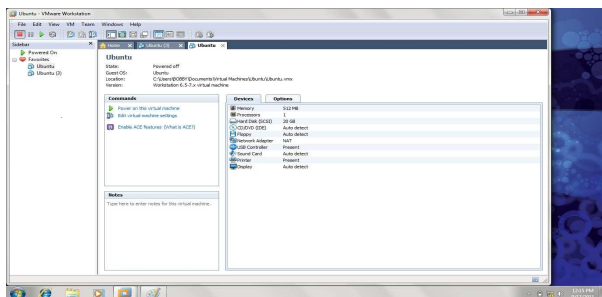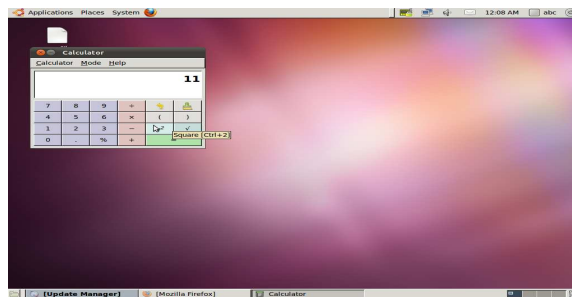
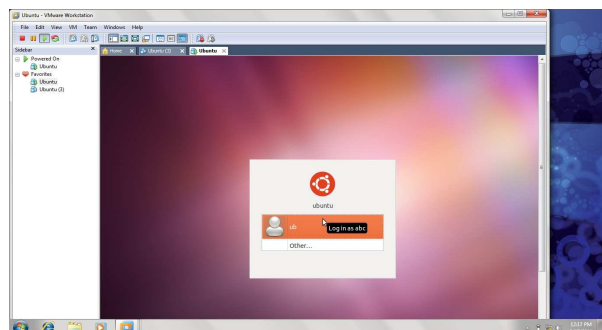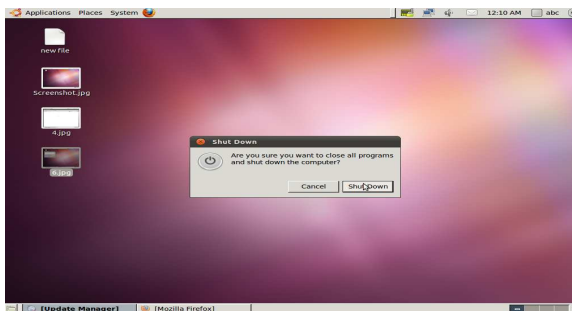Fig. 7. VMware Initialization
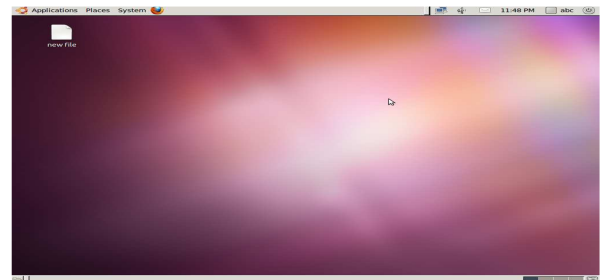

Fig. 8. Logging Virual Machine
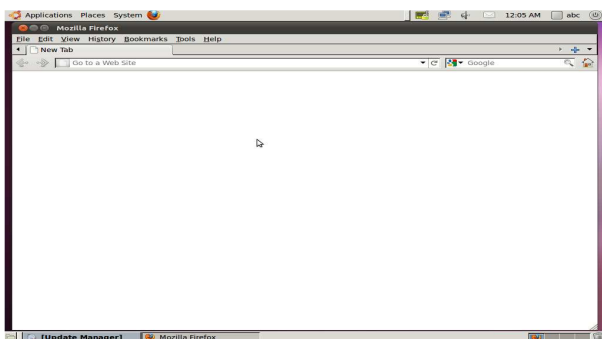

Fig. 9. Desktop of Virtual Machine

Fig. 10. Application of Virtual Machine

desktop of the UBUNTU in virtual machine. This becomes ready to use the applications of ubuntu without logging off the computer. We have considered the Mozilla Firefox browser as an application and another application as a calculator (i.e., to enable SaaS) in ubuntu running in windows. After using our needed applications we can Switch off the guest OS and can use the windows and we can use the windows application in ubuntu applications at the same time.

Fig. 11. Using Calculator of Virtual Machine

Fig. 12 Logging Off Virtual Machine

V.   CONCLUSION

We have effectively and efficiently implemented the Cloud Computing architecture to support SaaS by using UBUNTU platform for a simple application   like calculator and web browser. Further, we proposed to continue the study in the field of enhancing the security in virtual data centres in Cloud Environnement. Our future work is focused on   providing security in cloud that protects the data in the Cloud Environment.

REFERENCES

[1]   'Cloud Computing: Deployment Models, Delivery Models, Risks and Research Challenges' by Savu, L. 19-21 May, 2011.
[2]   Cloud Computing and the Lessons from the Past by Mikkilineni, R. Sarathy, V. July 1, 2009.
[3]   A Dependency-Aware Hierarchical Service Model for SaaS and Cloud Services by Wang, Rui Zhang, Yong Liu, Shijun Wu, Lei Meng, July, 2011.
[4]   Service-Cloud Model of Composed Web Services by Chen Yanping Li Zengzhi Wang Li Yang 4-7 July, 2005.
[5]   Towards enterprise software as a service in the cloud by Schaffner, J. Jacobs, D. Eckart, B. 1-6 March, 2010.
[6]   Virtualization Intrusion Tolerance Based on Cloud Computing, Yuesheng Tan; Dengliang Luo; 25-26 Dec. 2010.
[7]   Research on Storage Virtualization Structure in Cloud Storage Environment, Jun-wei Ge; Yong-long Deng; 29-31 Oct. 2010.
[8]   A framework for validation of virtualization environment in cloud infrastructure, Pham, C.; Chen, D.; 27-30 June 2011.
[9]   A Virtualization-Based SaaS Enabling Architecture for Cloud Computing, Liang Zhong; Tianyu Wo; 7-13 March 2010.
[10]   A trusted computing environment model in cloud architecture, Xiao-Yong Li; Li-Tao Zhou; 11-14 July 2010.
[11]   An architecture model of management and monitoring on Cloud services resources, Yuanhui Sun; Zongshui Xiao; 20-22 Aug. 2010.
[12]   A method and framework for quality of cloud services measurement, Dongmei Bao; Zongshui Xiao; 20-22 Aug. 2010.