Study of Cloud Setup for College Campus

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Abstract— Cloud Storage is an attractive concept in IT field since it allows the resources to be provisioned according to the user needs. It provides services on virtual machines whereby the user can share resources, software and other devices on demand. Cloud services are supported both by Proprietary and Open Source Systems. The project idea is about to provide cloud storage to store and upload the data for the teachers as study material, Assignments and other stuff. These drives also allow to the principal and Examination cell authorities to upload the current notices for student. The designed cloud storage (Drive) is used within Intranet by using LAN connection and also by using Wi-Fi. The Drive facilitates staff with a separate and limited space to store and upload data with its own access privileges. The platform used to implement the idea is Ubuntu-12.04. There are three necessary packages required to set up cloud in Ubuntu.

Keywords— cloud computing; Cloud storage; Openstack; Open source; Intranet.

INTRODUCTION

Cloud computing is a computing environment, where resources such as computing power, storage, network and software are abstracted and provided as services on the internet in a remotely accessible fashion [5]. Billing models for these services are generally similar to the ones adopted for public utilities. On-demand availability, ease of provisioning, dynamic and virtually infinite scalability is some of the key attributes of cloud computing [1]. The main aim of cloud computing is providing services.

It provides various types of services, some of the important services are SaaS, PaaS and IaaS.

A. *Software as a service (SaaS):*

It is a model of Software deployment whereby according to the demand of the customer a provider provides licensed application for the specified time.

B. *Platform as a service (PaaS):*

Generates all facilities required to support the complete cycle of construction and delivery of web-based applications wholly available in Internet with built in services so there is no need of downloading software or special installations by developers.

C. *Infrastructure as a Service (IaaS):*

It provides resources, such as servers, connections, storage and other necessary tools to construct an application design according to the need of organizations, making it quick, easy and economically viable.

Cloud computing is mainly classified into three types based on the deployment model: Public cloud, Private cloud and Hybrid cloud. If the services are provided over the internet then it is public cloud or external cloud and if it is provided within an organization through intranet then it is named as private cloud or internal cloud and Hybrid cloud is an internal/external cloud which allows a public cloud to interact with the clients but keep their data secured within a private cloud [2].

In this work we propose and discuss the design and Implementation of cloud service in college .We have seen implementation of cloud on larger scales in companies like Amazon etc, but not for college level. We are going to design a cloud setup for institution like college where request patterns and infrastructure are quite different from commercial settings.

The college can benefit significantly from private cloud infrastructure to service its various branches, research, and teaching requirements.

II. SALIENT DESIGN FEATURES OF OUR COLLEGE CLOUD SETUP

College consists of various department like information technology, computer, mechanical, automobile, etc. Each department has different computer labs .Each branch requires different software, platforms which are purchased by the college which needs to be installed on every computer of different labs according to the requirement. Thus by setting up the cloud there will be no need of doing so .All the software and form need to be installed only once which will be stored on cloud server. The designed cloud storage (Drive) is used within Intranet by using LAN connection and also by using Wi-Fi.

Principal of the college will be admin. So that all activities performed by staff members and students will be known to him. Each student and staff member will be assigned a unique-id for login purpose which will help in maintaining security.
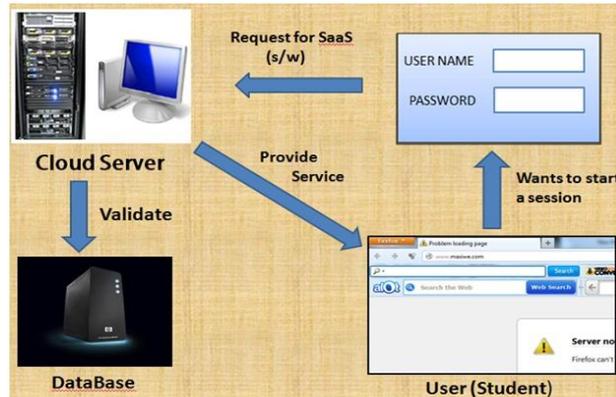

Fig2.1. Working of cloud infrastructure after setup

For example the above figure shows that whenever a student request for a particular software or platform he has to login using his/her id Allocated to him/her. If he/her is a valid user then the request is forwarded to the Cloud server .The cloud server with the help of database server validates the user and provides services.

The users of the drive are as follows:

  a) *Staff-*

  - Have rights to upload data.
  - Have rights to upload Softwares.
  - Have rights to download data.
  - Have rights to add platform, software etc.
  - User name as Employee ID.
  - Password will be user defined.

  b) *Examination-cell authorities-*

  - Can upload notices about Examination.
  - Can upload various Examination Results.

  c) *Principal-*

  - Can upload notices regarding student and teachers.
  - Can give suggestion to teachers and students.

  d) *Student-*

  - User name as Student ID and password-user defined.
  - Have only access to read and download data.
  - They can give feedback to teachers.
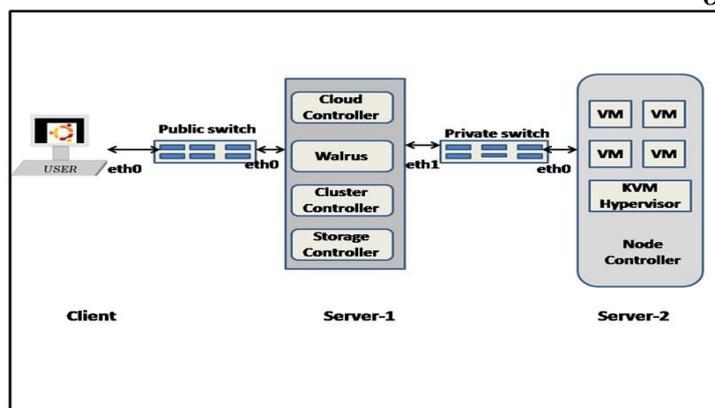
B. *Physical setup of cloud*

Fig3.1. Physical setup of cloud [3]

For physical setup, the requirements are as follows:

1) Two servers: Server 1 i.e. Cloud server.
                    Server 2 i.e. Node Controller
 2) Multiple clients: Users

The user will be communicates with server1 which is a cloud server with the help of public switch. The server 1 and server 2 will communicate with each other using private switch.

III.   REQUIREMENTS

A. *Software requirements:*

-Ubuntu 12.04, 64-bit Server CD with cloud edition

B. *Hardware requirement:*

Elements	Server 1	Server 2	Clients
CPU	Amd64 (1 GHz) 0r Processor with 2.63 GHz	Intel Core i3 (2.27 GHz) 0r Processor with 2.27GHz	Intel Core i3 (2.27 GHz) 0r Processor with 1.83 GHz
Memory	4 GB Minimum	4 GB Minimum	1 GB Minimum
Disk	7200 rpm	5400 rpm	5400 rpm
Disk Space	160 GB	40 GB	40 GB
Networking	100 Mbps	100 Mbps	100 Mbps

Table 3.1. Hardware Requirements for Ubuntu server

IV.   PREREQUISITE FOR SETTING UP CLOUD

There are four packages required for the installation of cloud using Ubuntu.

A.   MASS (Metal as a Service):

MASS stands for Metal as a Service. Its major function is to bring language of the cloud to physical servers. It makes it easy to set up the hardware on which services are deployed that needs to be scaled up and down dynamically. This feature is important in cloud since cloud requirement can fluctuate dynamically. Only With a simple web interface, we can add, commission, update and recycle servers at our will. As per requirements or needs change, we can respond rapidly, by adding new nodes and dynamically re-deploying them between services

B.   JUJU

Cloud Computing is known for its agility (the ability to quickly 'switch on' or 'switch off' services in response to changes in demand, rather than weeks of planning and a complex process of testing and implementation.) which is provided with the help of juju. Juju provides a uniquely straightforward way to extend existing deployments [2]. Juju deployments can be made to grow and shrink according to requirement or demand which is done with the help of juju charms. JUJU provides us with the facility of modifying services at real time.

V.   INSTALLATION

There are multiple ways to install Ubuntu Cloud Infrastructure.
- Ubuntu Cloud Live Image: a single node all in one cloud booting from USB
- Ubuntu Cloud Infrastructure with MAAS and Juju: our recommended method
- Install Ubuntu Cloud Infrastructure from packages: the hard way

A.Ubuntu Cloud Live Image

1. Download the image from http://cdimage.ubuntu.com/ubuntu-cloud-live/releases/12.04/
2. Create a USB stick using USB Creator or any other software.
3. Boot from the created USB stick
4. apt-get install juju

B. Ubuntu Cloud Infrastructures with MAAS and Juju

This install is done in three steps:
1. Install the MAAS server
2. Install Juju
3. Deploy Ubuntu Cloud Infrastructure with Juju

C. Installing the MAAS server

1. Install MAAS server [4]
2. Add enough nodes to support your Openstack

Note: If using juju-jitsu, the minimum recommended number of machines is 6.

D. Install Juju

This can be done on the same server you have deployed MAAS onto.

a) Create SSH keys

Juju requires SSH keys to be able to access the deployed nodes. In case those keys do not exist, then we have to create them before we bootstrap our environment:
ssh-keygen -t rsa

b) Deploy juju

1. Create a configuration file
2. Deploy from local branches of charms (optional)
3. Deploy the various services
4. Establish relation between services
5. Expose the services you want (optional)

After following all steps we will done with setup of cloud infrastructure. We explained recommended way of installing cloud infrastructure because we studied it in detail.

VI. FUTURE SCOPE

Additional software and platform can be included in cloud for the benefit of students. Softwares as well as platform must be updated with new versions. More features must be added with advance security measures.
This cloud infrastructure helps organizations for upgrading their facilities and adding new features to all users of it. It will reduce the hardware cost as well as software installation efforts.

VII. CONCLUSION

Cloud computing is an everlasting computing environment where data are delivered on-demand to authenticated devices in a secured manner and users utilize a shared and elastic Infrastructure. This paper briefly explains the set up of a private cloud in a cluster based environment using open source technologies like Eucalyptus, Openstack, MAAS and Juju. Services were included successfully and made available to the user. The current implementation of this paper provides Platform as a service (IaaS) and Software as a Service (SaaS).

This cloud infrastructure is effective for upgrading services. Cloud setup is cost efficient method and easy to implement and maintain.

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