Cloud based IT Infra with Central Identity

{ Project reboot }

Preliminary Project Plan

Project Guide

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Abstract

The main objective of "Cloud based IT Infra with Central Identity" is to develop new IT Infrastracture using private cloud and provide access to all its services using Central Identity which can be available to third party developers as Identity as a service with dynamic role management and resource endpoints.

New private cloud is aimed to develop using opensource tools such as OpenStack, Ubuntu and provide virtual machines with high computational power and best platform to providing the virtal labs rather than dedicated lab hardware.

Contents

Chapter 1

Introduction

1.1 Introduction

"Cloud Based IT Infra with Central Identity" is a complete solution, based on private cloud to enhance and effiecient utilization the IT Infrastructure of an emerging Universities and Organizations with Central Identity for all its users to access its services.

It is going to be developed in 3 phases

- *Private cloud*

- *Deploying Network Services*

- *Central Identity*

1.1.1 Private Cloud

Private Cloud establishment is targeted for hardware resource pooling, providing high computational and scalable virtual machines for deploying network based applications (smtp, proxy, ftp), web application and Network storage.

1.1.2 Deploying Network Services

Configuration of Uniform hardware experience over the complete university includes single sign on on every device, configuration of mail servers etc.

1.1.3 Central Identity

Essential part that combines normal network services(proxy, mail, etc.) and organizational web & native applications. In addtion to that this central identity is available to thrid party developers as API with dynamic based role user authentication protocols.

Chapter 2

Typical Solution

2.1 System under consideration

We have observed some organizations like RGUKT

- Failed to maintain large user load web services and network applications.

- No Central Identity, Storage & High capacity hardware resource pool.

- Redundent data in each prospect

- Inadequate resource requirements for Research.

- Dedicated computer course labs like Matlab, VLSI, etc.

2.2 Proposed System

To avoid above mentioned observations we are proposing one new system with

- Cloud based hardware resources clustering.

- Central Identity for Network Applicaitons with REST API.

- Dynamic user role management.

- Providing Virtual Labs (MatLab, etc.,).

- High Configurational Virtual Machines for research.
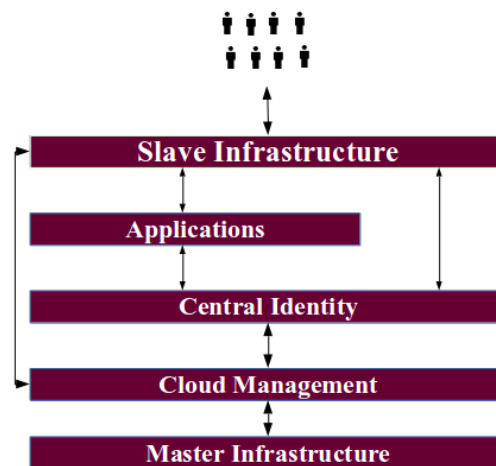
Chapter 3

Development

3.1 Development Stack

Figure 3.1: Developemnt Stack
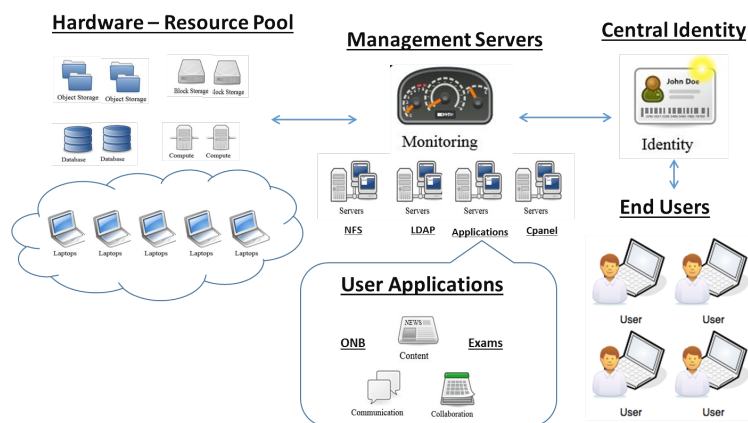
3.2 Development Architecture

Figure 3.2: Archtitecture

Chapter 4

Design and Approach

4.1 Existing System Specifications

- The environment we observed is our university, it cosists of 7000 students and more than 500+ faculty with 6 core Engg. departments apart from 2 years of PUC course.

- Each Department is having strength of 700 students they arrenged these students into various various classes of 60 to 70 each, total 10 to 12 number.

- Each student is provided with one Laptop with 2G RAM, 1.5GHz Clock speed and 200 GB Harddisk Storage.

- All students are using these sytems for more than 8 hours in a day.

- All these students has to provided with course content and course labs, they are maitaining dedicated labs with 50 - 60 machines.

- Hence redendent data and failed to moniter the content over those laptops and these labs are useful only at lab hourse most of time they are idle.

4.2 Proposed Design and Approach

We want to make use of entire departmental hardaware resources more on its students laptops capacity and create a common pool of resources hence easy to maintain and moniter.

We want to provide signle sign on implentation in each class of 60-70 laptops. such that user can use his own unique username to access university resources and later he can use the same password for network based or web based applications such as updates, mails, examinations, results etc.

User data can be data is retrevied from the Storage server like nfs while loging in to his laptop in any class room and his laptop's computational and storage capacity is used by the private cloud extentions that it make his laptop as slave node when ever laptop is available.

User can develop application and they can use Central Identity in their application with user control and access specifations for API calls.

Chapter 5

Implentation and Specifications

5.1 Implentation

For maintining above kind of envronment we have to setup one private cloud which will gives the highly scalable virtual machines to server the user need services on fly.

We want develop minal system with the above guidelines in a lab environment of 10 Master nodes and 5 client machines with uniform operating system and nfs data share. Later extended upto departmental level.

5.2 Specifications

- 15 Laptops with below configuration (10 Master Nodes + 5 Slave Nodes)

    - 4GB RAM, 500 GB Harddisk, Intel i3 processor 1.5GHz Clock

- Class C Network

    - Static IP for Master Nodes
    - DHCP / Static IP for Slave Nodes

- Uninterrupted power suply for Master Nodes.

5.3 Desired Technologies

- Opensource private cluod tools such as Openstack, Cloudstack, etc.

- Ubuntu 14.04 Server LTS.

- LDAP Active Directories, Kerbrose, Squid for Network proxy.

- OAuth 2.0 with extended dynamic roles managment.

- Nodejs for Implementation of OAuth 2.0 as REST API.

- Git for Version control.

- Ascii doc / python shpenix & Latex for Documentation.

5.4   Expcted Results

We are expecting the below results after successfull implemenation of "Cloud Based IT Infra with Central Identity" in lab enviroment with above mentioned specifications

- Hardware resoucre clusters from Master Nodes

  - 40 GB RAM
  - 5TB of Hard disk
  - 15 GHz Clock Speed

- Hardware resoucre clusters from Slave Node (available only at active period)

  - 20 GB RAM
  - 2TB of Hard disk
  - 7.5 GHz Clock Speed

- Well Documented Implementation of Central Identity for

  - Single Sign on of Client Machines.
  - Network applications proxy, mails.
  - University Web Services and Departmental websites.
  - Third party OAuth 2.0 Implemenation as API.

- Dynamic user role management for both Web and Native applications as API.

- Central Cloud Storage Pool.

- High Computational Virtual Machines.

- Virtual Labs insted of Dedicated labs in Remote Desktop or in SSH protocol.

- Content or Data Monitering in a Organization.

- Get full recovery and achieve more than 99.99% services up time.

- Extendable to several departments and Universities.

5.5 Project Time Line

Tentative Project Time Line and Deadlines for differnt moudles and break points

Module	Start Date	End Date	Status
Central Identiy - Profile, Resourses, Login	1st Oct	8 Oct	
Central Identiy - Admin Portal	8 Oct	21 Oct	
Central Identiy - OAuth API	8 Oct	31 Oct	
Signle Sign on	15st Oct	8 Nov	
Private Cloud Construction	1 Nov	15 Nov	
Deploying Applications on Private Cloud	15 Nov	8 Dec	
Automation of User deployment & Cloud configuration	21 Nov	1 Dec	
Integration of Modules	1 Dec	15 Dec	
Unit Testing after Integration	8 Dec	21 Dec	
Complete Testing	15 Dec	31 Dec	

- Unit Testing of each module for 2 – 3 days.

- Each module has to be docuemnted in parallel.

Chapter 6

References

6.1   Web References

- Ubnutu OS, http://www.ubuntu.com/

- Openstack, https://openstack.org/

- Linux Bible, http://tuxnetworks.blogspot.com

- OAuth 2.0, http://oauth.net/

- Node.js https://nodejs.org

- Git, https://github.com

- Ascii doc, http://asciidoc.org

- Bootstrap, http://getbootstrap.com

- Stack Overflow http://stackoverflow.com/