E-CLOUD – EFFECTIVE RESOURCE SHARING MECHANISM IN CLOUD ENVIRONMENT

Motivation

- In IaaS layer according to the user request virtual machines move to the running state.
- When several requests coming to the same time some times Cloud environment hangs on and some requests are misplaced.
- When multiple requests are coming to the same virtual machine object :
  - If a concurrent write occurs to an object in the bucket while object having previous write for the same object, the previous write concern as an invalidated write.

Objectives

- Establish proper request handling mechanism inside the IaaS layer.
- Keep older versions of user data without moving to the invalidated state.
- Introduce a cloud services supported lab environment for the University.
- User can send their cloud requests by using SOAP or REST services.
  - Request is first reached to the Cloud Controller which acts as a main control unit.
  - For the second step request is moved to the Cluster Controller, mainly cluster controller uses as a communication medium between Cloud Controller and Node Controller.
  - In addition to that, the Cluster Controller manage the Node Controllers according to the Cloud Controller requests.
  - Node Controller performs a Cluster Controller requests by using stored images and resources and communicating with Walrus.

Implementation

- Configured the server machine to create the Cloud environment.
- Installed Xen hypervisor on top of Debian OS for the cloud environment.
- Installed the EUCALYPTUS source package with Cloud components.
- Installed the DHCP server to allocate the IP address for the up and running virtual machines.
- Changed the Cloud controller request handling mechanism by modifying the Cloud controller source code and rebuild the source package by using Apache ant and reinstalled the EUCALYPTUS cloud environment.
- Created the virtual machines by using BTRFS tools which is supported COW feature.
- Uploaded the virtual machines in to the cloud environment and gather profiling data by up and running the virtual machines.

Research Findings

- Locking mechanism introduces Cloud controller to handle the multiple requests in a proper way.
- BTRFS supported VM images provide the COW feature and generate VM copies without losing the previous user data.
- By analyzing the profile data, empirically proved that proposed system effectively use the cloud resources when compare to the previous system.
- It is feasible that proposed system can be used as a low cost lab environment within University.

Approach and Design

- For the first step we created the open source cloud environment by using the EUCALYPTUS cloud creation tool.
- EUCALYPTUS is an open-source Java based cloudcomputing framework that uses for the computational and storage infrastructure.
- EUCALYPTUS consists with four major components which are:
  - Cloud Controller : Act as a main control unit of the application.
  - Walrus : Act as a storage container and controller.
  - Node Controller : Use for the communication medium and between cloud controller and node controller. In addition to that manage the node controllers according to the cloud controller requests.
  - Cluster Controller : Act as a main control unit of the application.
- We planned to add proposed locking mechanism for the Cloud controller.
- For the versioning we used to use COW feature enabled file system to create the virtual machines which are available in IaaS layer.

Detailed Architecture

- For the versioning we moved to use COW feature enabled file system to create the virtual machines which are available in IaaS layer.
- In our research we tried to provide IaaS cloud services to the end users by using University lab resources.
- Introduced locking mechanism for the common files which related to the same virtual machine to enhance the request handling mechanism in between the cloud components.
- Integrated the version control mechanism for the virtual machine, by enabling the Copy On Write (COW) feature.

Overview of the System

Abstract

- Cloud computing and Virtualization are two things.
- Virtualization can be divided in to two parts.
- Full system virtualization is a virtualization technique used to provide virtual machine environment exactly same as complete simulation of the underlying physical hardware.
- Para virtualization introduces the virtual machine abstraction that is similar but not identical to the underlying hardware.
- Cloud computing means access the virtualized resources or cloud services by using the Internet or web services such as SOAP or REST.
- Cloud services can be categorized in to three major components.
- IaaS : Infrastructure as a Service , Paas : Platform as a Service , SaaS : Software as a Service
- In our research we tried to provide IaaS cloud services to the end users by using University lab resources.
- In addition to that we managed to enhance the IaaS layer introducing new functionalities which were not available in the IaaS layer.
- Introduced locking mechanism for the common files which related to the same virtual machine to enhance the request handling mechanism in between the cloud components.
- Integrated the version control mechanism for the virtual machine, by enabling the Copy On Write (COW) feature.