

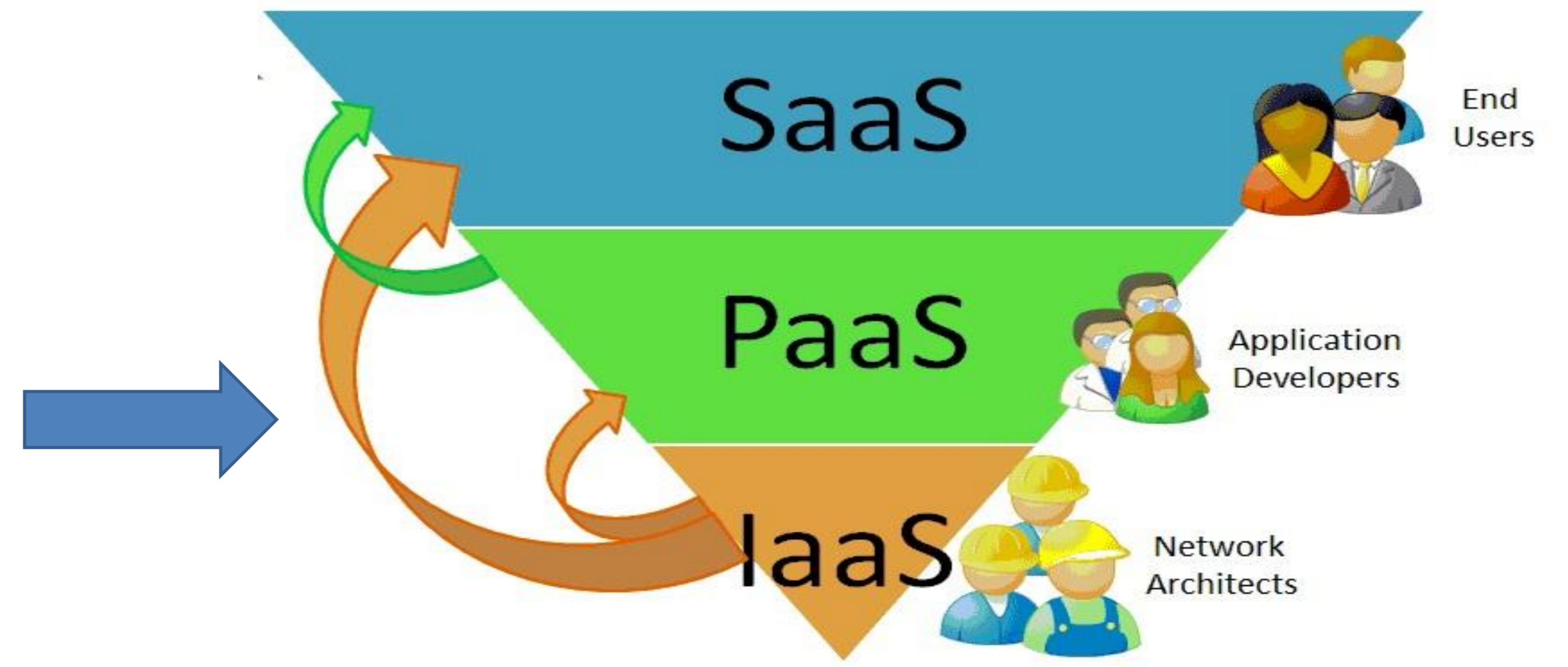
# E-CLOUD – EFFECTIVE RESOURCE SHARING MECHANISM IN CLOUD ENVIRONMENT

Upatissa Thimira , Atukorale Ajantha  
thimirac@gmail.com , aja@ucsc.cmb.ac.lk

## 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 .

## Cloud Services



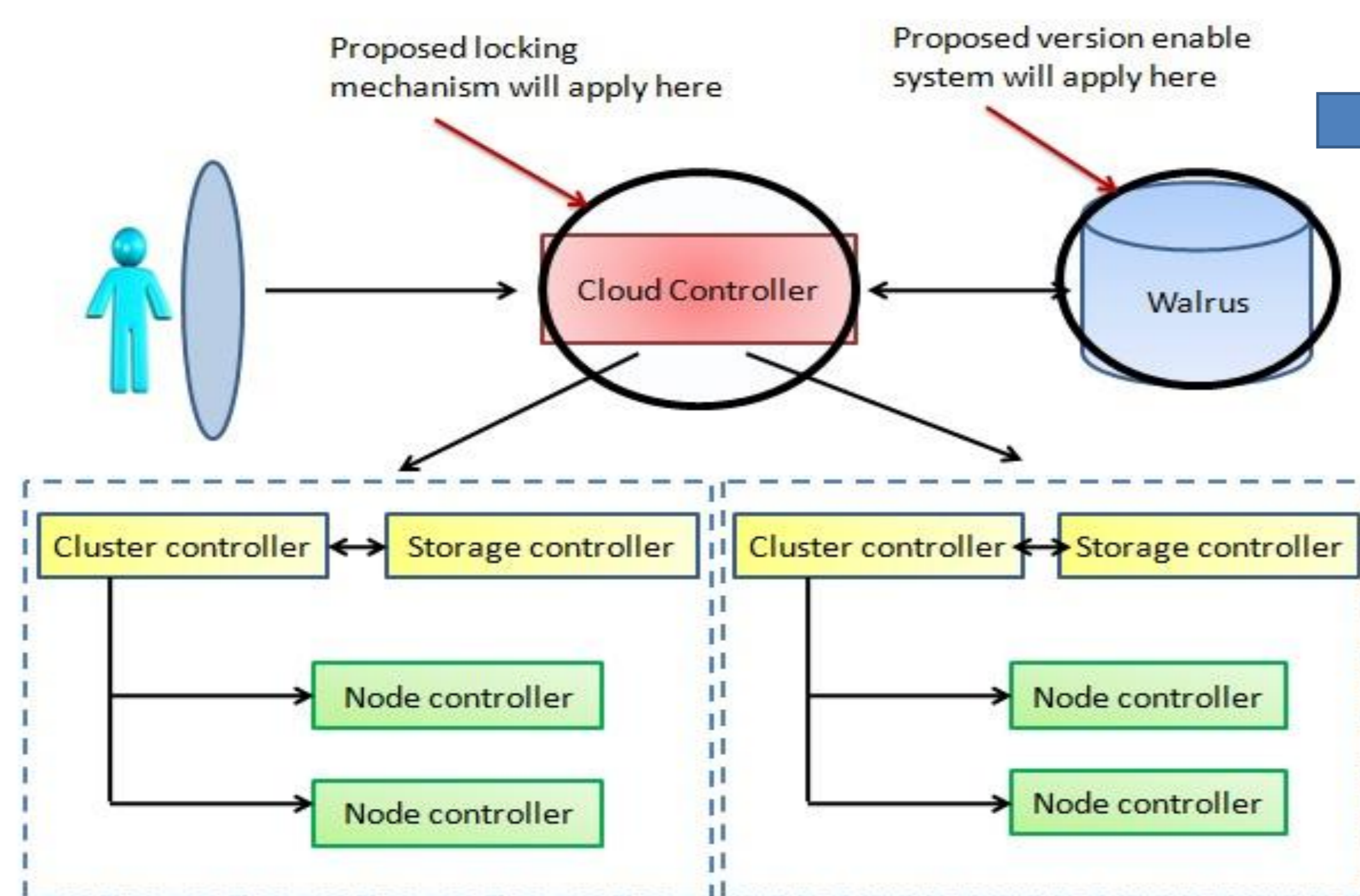
## Approach and Design

- ✓ 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 cloud-computing 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
  - ✓ Storage Controller (Walrus) : Act as a storage container and controller .
  - ✓ Cluster 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 .
  - ✓ Node Controller : Perform a cloud controller requests by using stored images and resources.
- ✓ We planned to add proposed locking mechanism for the Cloud controller.
- ✓ For the versioning we moved to use COW feature enabled file system to create the virtual machines which are available in IaaS layer .

## 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 .

## Detailed Architecture



## Objectives

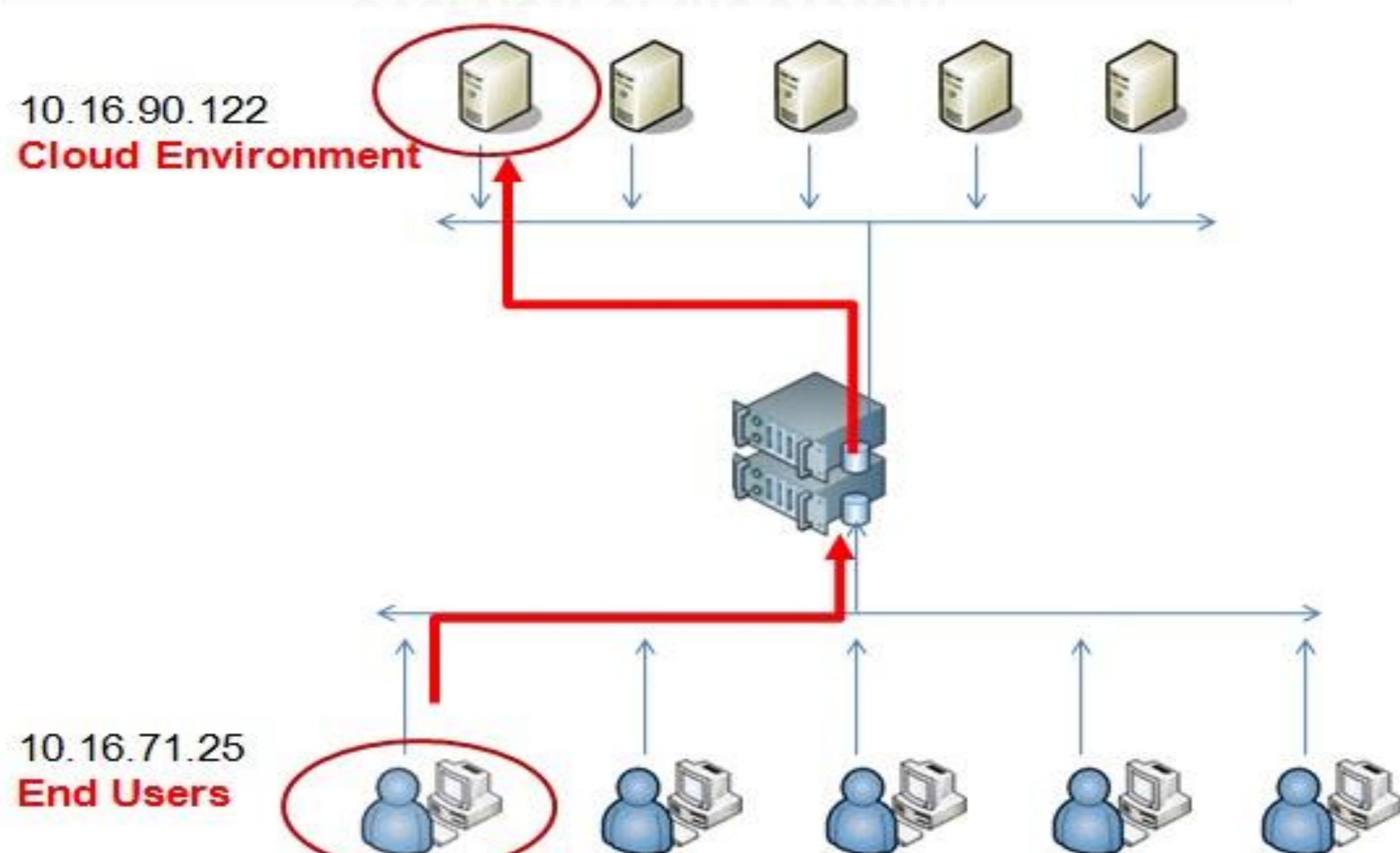
- ✓ Establish proper request handling mechanism inside the IaaS layer .
- ✓ Keep older versions of user data without moving to the invalidated state .
- ✓ Introduce a cloud services supported lab environment for the University .
- ✓

- ✓ User can send their cloud requests by using SOAP or REST services .
- ✓ Request is first reached to the Cloud Controller which act s 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 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 .

## Overview of the System



## 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 we 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 .