

SURVEY PAPER ON CLOUD COMPUTING

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ABSTRACT

Cloud computing is an attractive computing model as it allows for resources to be provisioned according on a demand basis. Cloud uses open source operating system like Ubuntu 10.04 server addition. It replaces traditional software installations, licensing issues into complete on-demand services through Internet.

I INTRODUCTION

Cloud Computing is a model which is found everywhere; it is convenient, on demand network access to a shared pool of configuration computing resource .Example Network server, storage application & service provider interactions. For example on facebook a social networking website users upload videos which uses cloud providers storage service so less hardware cost for clients [1].

There are three types of cloud computing models: Public cloud, Private cloud & Hybrid cloud. In public cloud, the resources are provided over internet to all the clients. In Private cloud, resources are provided over intranet within an organization. Hybrid cloud is a provision depending on requirement can provide resources within an organization or publicly.

II SERVICE MODEL CLASSIFICATION

Depending on the service models [2] , clouds are classified as:

1. Software as a Service (SaaS): In this model the user purchases the ability to use a software application or service on the cloud. Example Google Docs
2. Platform as a Service (PaaS):In this model the user purchases access to platforms, enabling them to deploy their own applications on the cloud. .Example Google App Engine
3. Infrastructure as a Service (IaaS): In this model, the user is delivered infrastructure, namely servers, networks and storage. The user can deploy several Virtual Machines and run specific Operating System on them. .Example Amazon EC2, Windows Azure etc.

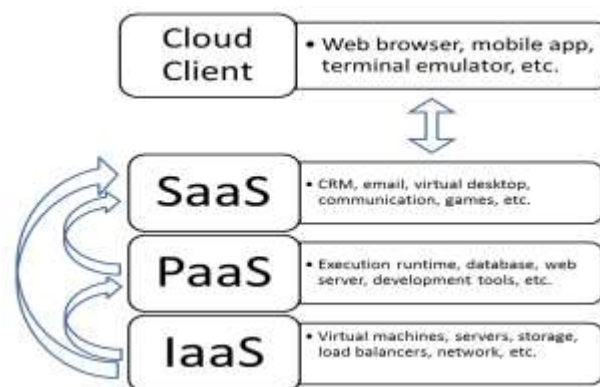


Fig.1 Service Models

III EUCALYPTUS ARCHITECTURE

It is an open source cloud computing framework focused on academic research. It provides resources for experimental instrumentation and study. Eucalyptus users are able to start, control, access and terminate entire virtual machines. In its current version, Eucalyptus supports VMs that run atop the Xen supervisor [3].

The Eucalyptus project has four characteristics that differentiate it from other cloud computing solutions:

- a) Eucalyptus was designed to be simple without requiring dedicated resources;
- b) Eucalyptus was designed to encourage third-party extensions through modular software framework and language-agnostic communication mechanisms;
- c) Eucalyptus external interface is based on the Amazon API and
- d) It provides a virtual network.

3.1 Eucalyptus is Comprised of Six Components

- a. **Cloud Controller (CLC):** It is a java program that acts as a web interface to the outer world. The CLC acts as the administrative interface for the cloud, querying the other components about resource availability and performing high level resource scheduling by making requests to the Cluster Controller (CC). The CLC can be accessed through command line interfaces like euca2ools to manage storage and network resources. Only one CLC can exist per cloud and it handles all authentication, accounting, reporting etc [4].
- b. **Walrus:** Walrus is a java program which is Eucalyptus equivalent of the AWS Simple Storage. Walrus offers users the ability to store persistent data, organized as buckets and objects, to all the virtual machines and can be used as a simple HTTP put/get storage as a service solution. There are no particular data type restrictions. Users can store application data as well as the images which are the building blocks used to launch the VMs. Volume snapshots, which are point in time copies of data, can also be stored on Walrus.
- c. **Cluster Controller:** Cluster Controller is written in C and acts as the front end of a particular cluster within the Eucalyptus Cloud. It executes on a machine that has connectivity to both the CLC and the Node

Controllers (NC) and reports the NCs registered to the CLC.CC also gather the information about a set NCs and schedules the VM execution on specific NCs. The CC also manages the virtual machine networks and all NCs within a single CC will belong to a single subnet.

- d. **Storage Controller:** Storage Controller, written in Java, is the Eucalyptus equivalent of the Amazon's Elastic Block Storage. It can interface with various types of storage systems. It communicates with the Cluster Controller and Node Controller and manages the Eucalyptus block volumes and snapshots to the instances within its specific cluster. EBS volumes persist even after VM termination but cannot be shared between VMs and can only be accessed within the same availability zone in which the VM is running.
- e. **Node Controller:** The Node Controller (NC) is written in C and it runs on the machine that hosts the VM instances. It runs on each node and interacts with the CC on one hand and the OS and the hypervisor on the other side. It controls VM activities like the execution, inspection and termination of VM instances. It downloads and creates caches of images and snapshots from the Walrus. It is also responsible for the management of the virtual network endpoint. There is no theoretical limit to the number of NCs per cluster but performance limits do exist.

3.2 Benefits of Eucalyptus

1. Eucalyptus has a modular and easy design which enables a variety of user interfaces and thus brings the benefits of virtualization to a broad spectrum of users like administrators, developers, managers and hosting customers.

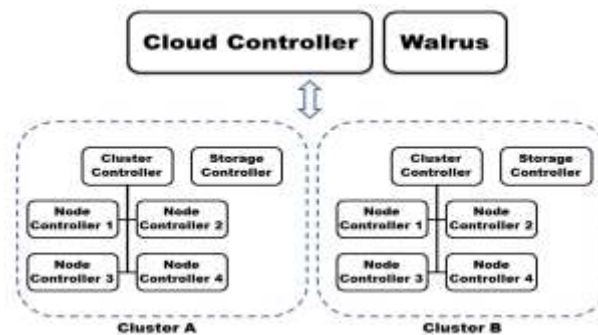


Fig.2 Eucalyptus architecture

2. The snapshot feature provides opportunities to improve the reliability and automation of the cloud making it very easy to use and reduce average learning time for users, thus improving turnaround time for projects.
3. Supports existing virtualization technologies, Linux-based operating systems, and supports multiple hypervisors.
4. Since the core of the Eucalyptus project will continue to remain open-source, users can access the different resources at different place.

3.3 Eucalyptus Framework Setup

SYSTEM REQUIREMENTS

1. Compute Requirements:

- 1. Physical Machines:** All Eucalyptus components must be installed on physical machines, not virtual machines [5].
- 2. Central Processing Units (CPUs):** It is recommended that each machine in your Eucalyptus cloud contain either an Intel or AMD processor with a minimum of two, 2GHz cores.
- 3. Operating Systems:** Eucalyptus supports Ubuntu 12.04 LTS and some other Linux distributions.
- 4. Machine Clocks:** Each Eucalyptus component machine and any client machine clocks must be synchronized (for example, using NTP) at all the time, not just at installation.
- 5. Hypervisor:** Ubuntu 12.04 LTS installations must have KVM installed and configured on NC host machines. VMware-based installations do not include NCs, but must have a VMware hypervisor pool installed and configured.
- 6. Machine Access:** Verify that all machines in your network allow root or pseudo access and SSH login.

STORAGE AND MEMORY REQUIREMENTS

The following are recommended:

1. Each machine in your network needs a minimum of 30 GB of storage.
2. At least 100 GB for Walrus and SC hosts running Linux VMs.
3. 50-100 GB per NC host running Linux VMs.
4. Each machine in your network should have at least 4 GB RAM or above for improved caching.

3.4 Network Requirements

1. All NCs must have access to a minimum of 1 GB Ethernet network connectivity [6].
2. All Eucalyptus components must have at least one Network Interface Card (NIC) for a base-line deployment. For better network isolation and scale, the CC should have two NICs each with a minimum of 1 GB Ethernet (one facing the CLC/user network and one facing the NC/VM network).
3. Depending on some configurations, Eucalyptus requires that you make available two sets of IP addresses. The first range is private, to be used only within the Eucalyptus system itself. The second range is public, to be routable to and from end-users and VM instances. Both sets must be unique to Eucalyptus, not in use by other components or applications within your network.

IV REGISTERING EUCALYPTUS

Eucalyptus implements a secure protocol for registering separate components. You only need to register components the first time Eucalyptus is started after it was installed.[6][7]

Most registration commands run on the CLC server. NCs, however, are registered on each CC. Note that each registration command will attempt an SSH as root to the remote physical host where the registering component is assumed to be running. The registration command also contacts the component so it must be running at the time of the command is issued.

NCs need only two pieces of information: component name and IP address. Other component requires four pieces of information:

1. The component (`-register-XYZ`) you are registering, because this affects where the commands must be executed.
2. The partition (`-partition`) the component will belong to. The partition is the same thing as availability zone in AWS.
3. The name (`-component`) ascribed to the component. This name is also used when reporting system state changes which require administrator attention. This name must be globally-unique with respect to other component registrations.
4. The IP address (`-host`) of the service being registered.

V FUNCTIONALITY

The Eucalyptus User Console provides an interface for users to self-service provision and configure compute, network, and storage resources. Development and test teams can manage virtual instances using built-in key management and encryption capabilities. Access to virtual instances is available using familiar SSH and RDP mechanisms. Virtual instances with application configuration can be stopped and restarted using encrypted boot from EBS capability [7].

IaaS service components Cloud Controller, Cluster Controller, Walrus, Storage Controller, and VMware Broker are configurable as redundant systems that are resilient to multiple types of failures. Management state of the cloud machine is preserved and reverted to normal operating conditions in the event of a hardware or software failure.

Eucalyptus can run multiple versions of Windows and Linux virtual machine images. Users can build a library of Eucalyptus Machine Images (EMIs) with application metadata that are decoupled from infrastructure details to allow them to run on Eucalyptus clouds. Amazon Machine Images are also compatible with Eucalyptus clouds. VMware Images and vApps can be converted to run on Eucalyptus clouds and AWS public clouds.

Eucalyptus user identity management can be integrated with existing Microsoft Active Directory or LDAP systems to have fine-grained role based access control over cloud resources[8].

Eucalyptus supports storage area network devices to take advantage of storage arrays to improve performance and reliability. Eucalyptus Machine Images can be backed by EBS-like persistent storage volumes, improving the

performance of image launch time and enabling fully persistent virtual machine instances. Eucalyptus also supports direct-attached storage.

VI CONCLUSION

It is used to build private, public and hybrid clouds. It can also produce your own datacenter into a private cloud and allow you to extend the functionality to many other organizations. Eucalyptus provides APIs to be used with the web services to cope up with the demand of resources used in the private clouds.

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