EUCALYPTUS Cloud

What's in a name?

Elastic Utility Computing Architecture Linking Your Programs To Useful Systems

- Eucalyptus is a simple open architecture for implementing cloud functionality at the IaaS level.
- It is specifically designed to be easy to install and maintain in a research setting, *and* that it is easy to modify, instrument, and extend.
- Eucalyptus can be deployed and executed without modification to the underlying infrastructure.
- Eucalyptus components have well defined interfaces (described by WSDL documents), support secure communication (using WS-Security policies), and rely upon industry-standard Web-services software packages (Axis2, Apache, and Rampart).

OpenStack vs Eucalyptus

- Both OpenStack and Eucalyptus are IaaS cloud frameworks (similar functionality)

A Secure Cloud

- Eucalyptus is a Linux-based open source software architecture that implements efficiency-enhancing
  - private and
  - hybrid clouds
- A Eucalyptus private cloud is deployed across an enterprise's "on-premise" data center infrastructure and is accessed by users over enterprise intranet.
- Thus sensitive data remains Entirely secure from external intrusion behind the enterprise firewall.

Features of Eucalyptus

- **Open Source**

  you can download it and have the source code at your fingertips.
- **Modular**

  The Eucalyptus components have well-defined interfaces (via WSDL, since they are web services) and thus can be easily swapped out for custom components.
- **Distributed**

  Eucalyptus allows its components to be installed strategically close to the needed/used resources. For example Walrus can be installed close to the storage, while the Cluster Controller can be installed close to the cluster it will manage.
- **Designed to Perform**

  Eucalyptus was designed from the ground up to be scalable and to achieve optimal performance in diverse environments (designed to overlay an existing infrastructure).

Features of Eucalyptus

- **Flexible**

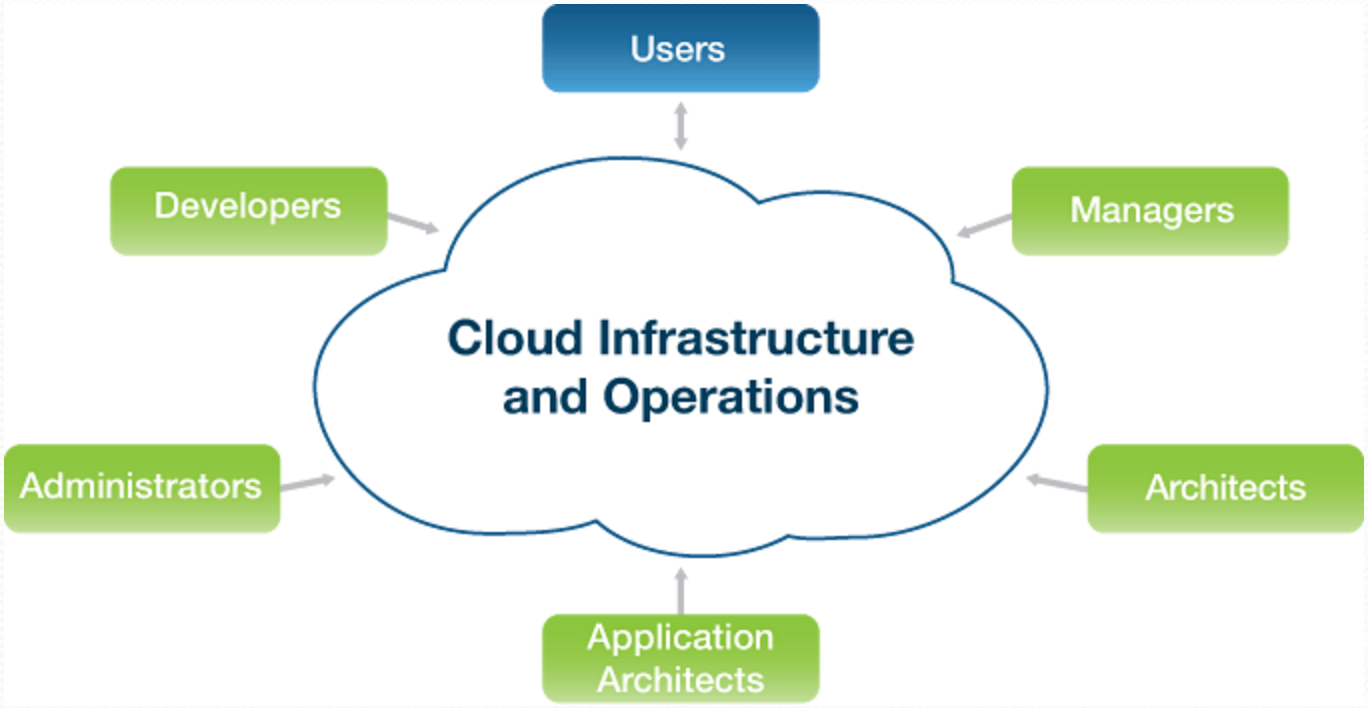
  Eucalyptus is flexible and can be installed on a very minimal setup. Yet it can be installed on thousands of cores and terabytes of storage. And it can do so as an overlay on top of an existing infrastructure.
- **Compatible**

  Eucalyptus is compatible with the most popular and widely used Cloud API currently available: Amazon EC2 and S3.
- **Hypervisor Agnostic**

  Currently Eucalyptus fully supports KVM and Xen. Additionally, the Enterprise Edition supports the proprietary VMware hypervisor.
- **Hybrid Cloud**

  The above characteristics makes Eucalyptus easy to deploy as an hybrid cloud. An hybrid cloud combines resources drawn from multiple clouds, typically one private and one public.

CLOUD ROLES


Users
Developers
Managers
Cloud Infrastructure and Operations
Administrators
Architects
Application Architects

CLOUD ROLES

Managers

- Availability of cloud resources
- Quality of cloud services
- Cloud usage billing and costing
- Establishing IT processes and best practices

Administrators

- Daily production and operational support of cloud platform
- Continuous monitoring and status reporting of cloud platform
- Maintaining service level agreements

CLOUD ROLES

Application Architects

- Developing and adapting applications to cloud deployments
- Information management and adapting data management to cloud deployments
- Cloud Service design, implementation, and lifecycle support

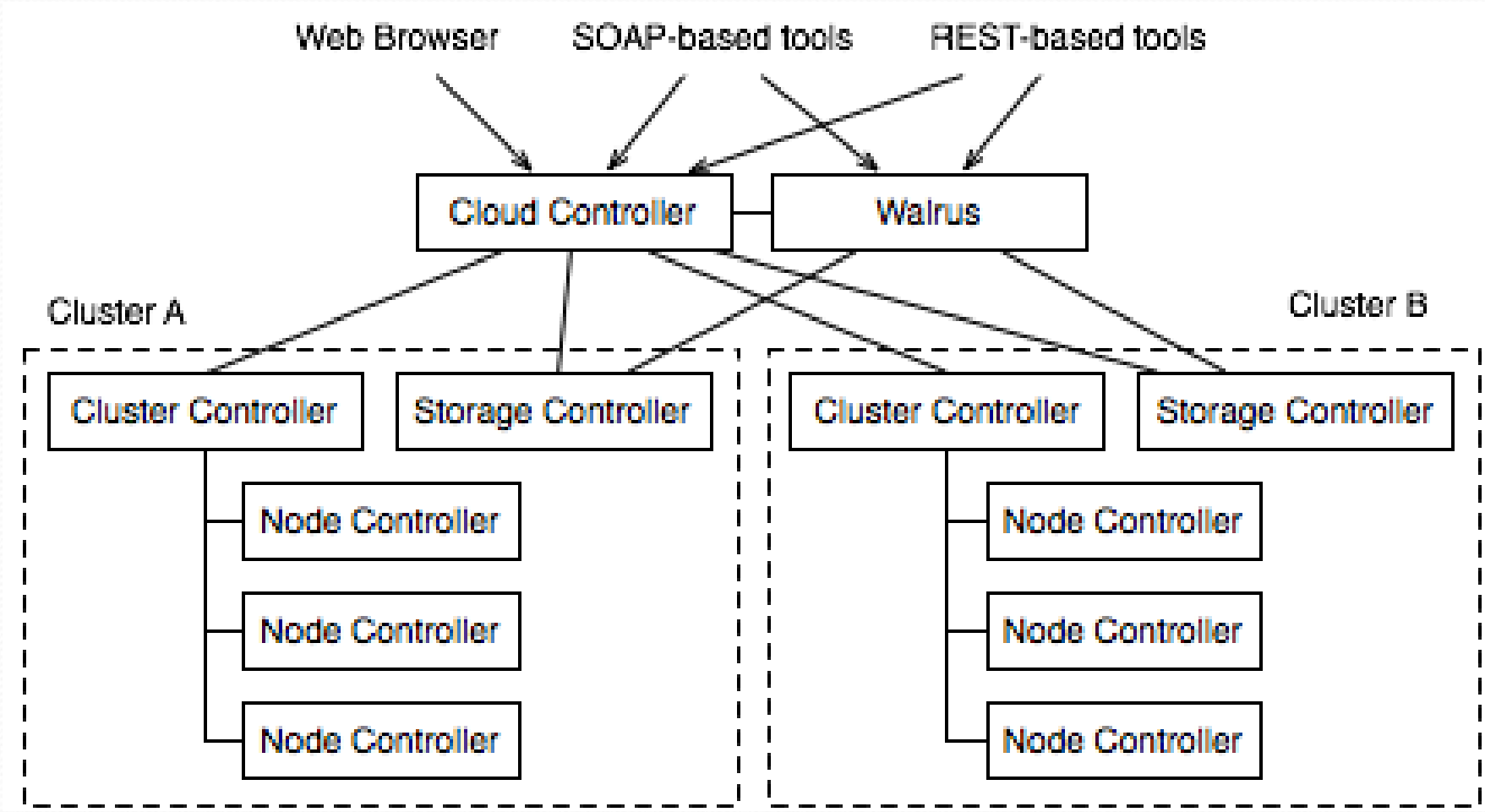
Users

- On-demand provisioning of compute, network, and storage resources
- Self-service configuration of cloud resources
- Transparency on service costs and levels

Eucalyptus Components

- Cloud controller (CLC)
- Walrus
- Storage controller
- Cluster controller (CC)
- VMBroker (optional)
- Node controller

Components of Eucalyptus



Cloud Controller (CLC)

The Cloud Controller (CLC) is the entry-point into the cloud for administrators, developers, project managers, and end-users.

Functions:

- Monitor the availability of resources on various components of the cloud infrastructure, including hypervisor nodes that are used to actually provision the instances and the cluster controllers that manage the hypervisor nodes
- Resource arbitration { Deciding which clusters will be used for provisioning the instances }
- Monitoring the running instances

Cluster Controller(CC)

The Cluster Controller (CC) generally executes on a cluster front---end machine, or any machine that has network

- Connectivity to both the nodes running NCs and to the machine running the CLC. CCs gather information about a set of VMs and schedules VM execution on specific NCs. The CC also manages the virtual instance network and participates in the enforcement of
- All nodes served by a single CC must be in the same broadcast domain (Ethernet).

Functions:

- To receive requests from CLC to deploy instances
- To decide which NCs to use for deploying the instances on
- To control the virtual network available to the instances
- To collect information about the NCs registered with it and report it

  to the CLC

Node Controller (NC)

- The Node Controller (NC) is executed on every node that is designated for hosting VM instances.
- NCs control the execution, inspection, and termination of VM instances on the host where it runs, fetches and cleans up local copies of instance images (the kernel, the root file system, and the ramdisk image), and queries and controls the system software on its node (host OS and the hypervisor) in response to queries and control requests from the cluster controller. The Node controller is also responsible for the management of the virtual network endpoint.

Functions:

- Collection of data related to the resource availability and utilization
- on the node and reporting the data to CC
- Instance life cycle management

Storage Controller (SC)

- The Storage Controller (SC) provides functionality similar to the Amazon Elastic Block Store (Amazon EBS). The SC is capable of interfacing with various storage systems (NFS, iSCSI, SAN devices, etc.).
- Elastic block storage exports storage volumes that can be attached by a VM and mounted or accessed as a raw block device

Walrus

- Walrus allows users to store persistent data, organized as buckets and objects.
- You can use Walrus to create, delete, and list buckets, or to put, get, and delete objects, or to set access control policies.
- Walrus is interface compatible with Amazon's Simple Storage Service (S3), providing a mechanism for storing and accessing virtual machine images and user data.

VMware Broker

- VMware Broker (Broker or VB) is an optional Eucalyptus component, which is available if you are a Eucalyptus Subscriber.
- VMware Broker enables Eucalyptus to deploy virtual machines (VMs) on VMware infrastructure elements. VMware Broker mediates all interactions between the CC and VMware hypervisors (ESX/ESXi) either directly or through VMware vCenter.

Benefits of The Eucalyptus

- **Scalable data center infrastructure**. Eucalyptus clouds are highly scalable, which enables an organization to efficiently scale-up or scale-down data center resources according to the needs of the enterprise.
- **Elastic resource configuration**. The elasticity of a Eucalyptus cloud allows users to flexibly reconfigure computing resources as requirements change. This helps the enterprise workforce remain adaptable to sudden changes in business needs.
- **Open source innovation**. Highly transparent and extensible, Eucalyptus' open source core architecture remains entirely open and available for value- adding customizations and innovations provided by the open source development community.
- The Eucalyptus open source software core is available for free download at www.eucalyptus.com.

Benefits of Eucalyptus

- **Hybrid cloud capability**. Eucalyptus interacts seamlessly with Amazon public cloud services, including EC2 and S3, with no software modification required.
- This allows IT organizations to quickly “cloudburst” into the public cloud space without purchasing additional data center hardware during very large spikes in enterprise resource demand.
- For example, RightScale, CohesiveFT, Zmanda, rPath are just a few of the partners that deliver solutions for Amazon AWS that in turn work seamlessly with Eucalyptus

References:

- Eucalyptus Cloud Computing Platform Administrator s Guide
  https://docs.eucalyptus.cloud/eucalyptus/5/admin_guide/managing_system/system_concepts/

THANK YOU