

Experiences with Eucalyptus: Deploying an Open Source Cloud

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Overview

- Introduction and Background
- Eucalyptus experiences and observations
 - Scalability
 - Security
 - Support
- Our chosen support model
- Conclusions and future work

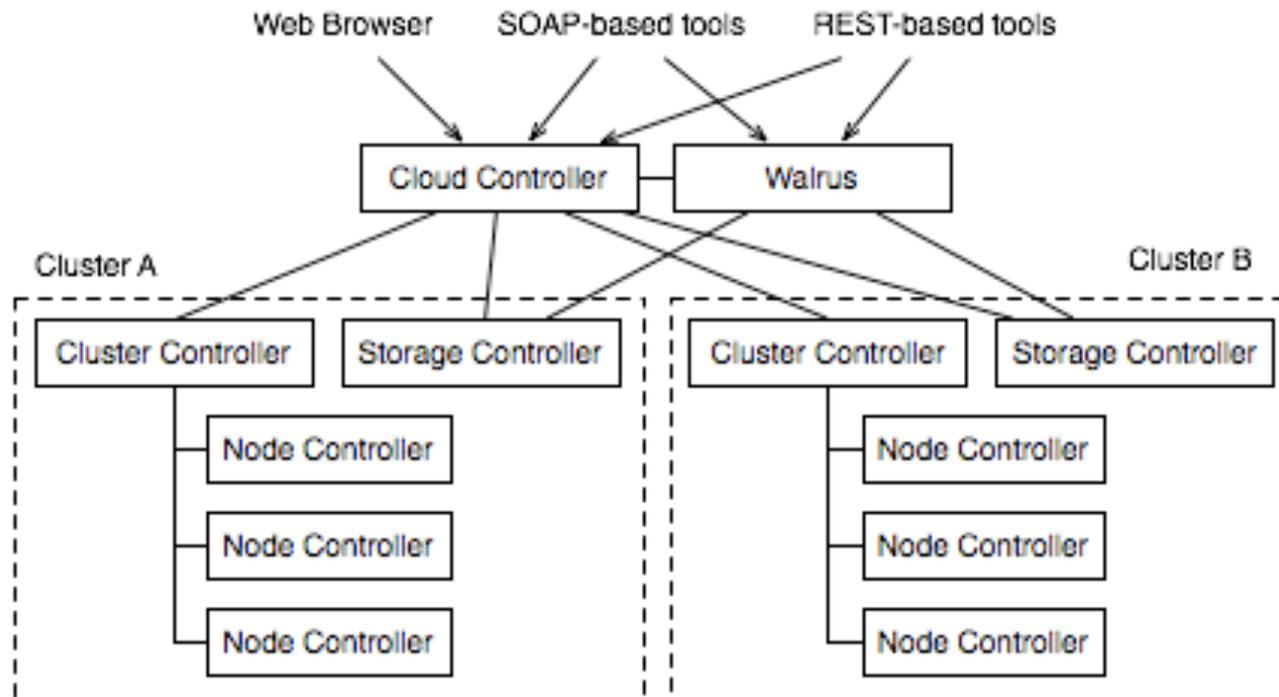


Introduction

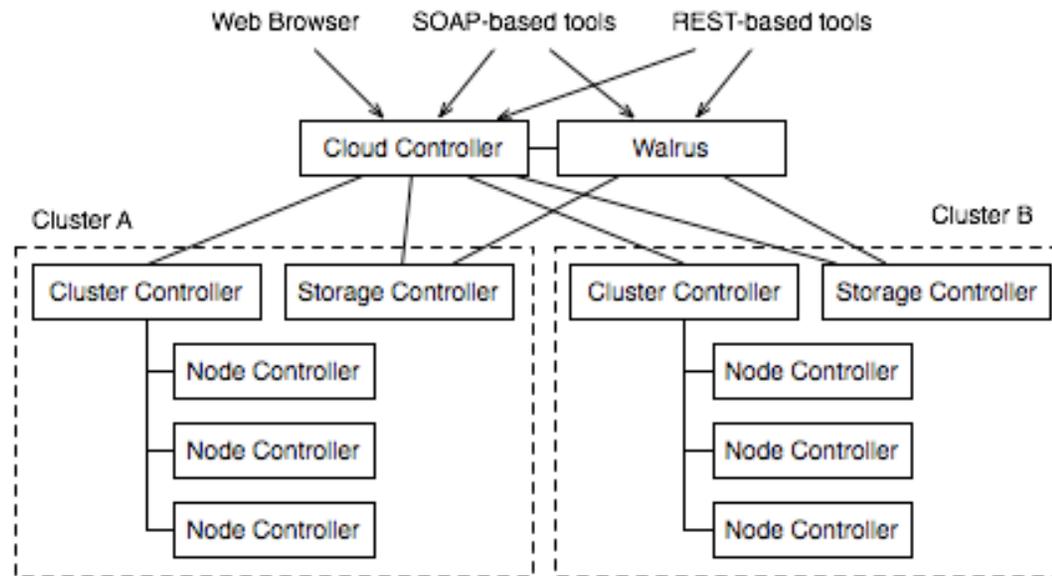
- Clouds for scientific computing?
 - Magellan Project
 - buy or build
- What cloud software is available?
 - Different Cloud APIs
 - EC2 (<http://aws.amazon.com/ec2/>)
 - Rackspace (http://www.rackspacecloud.com/?CMP=Google_rackspace+cloud_exact)
 - Nimbus (<http://www.nimbusproject.org/>)
 - many more out there
- Why did we choose Eucalyptus?
 - EC2 compatibility
 - Open Source / Free
 - UEC from Ubuntu



Eucalyptus 1.6.2



Eucalyptus Scalability: Cluster sizes



- Tested Eucalyptus with various sized clusters (40, 80, 160, 240 nodes behind one cluster controller)
- All-around performance best with smaller clusters
- Performance deteriorated as clusters size grew due to iterative operations
- Eucalyptus instance termination operation is serial
 - Instances that don't terminate in a timely manner are communicated to all nodes
 - The process delays other activities while it works on terminating instances
 - Naturally, larger clusters result in longer execution times for such operations
 - Instance requests which never left the cluster controller due to errors are still "terminated" on the node controllers!

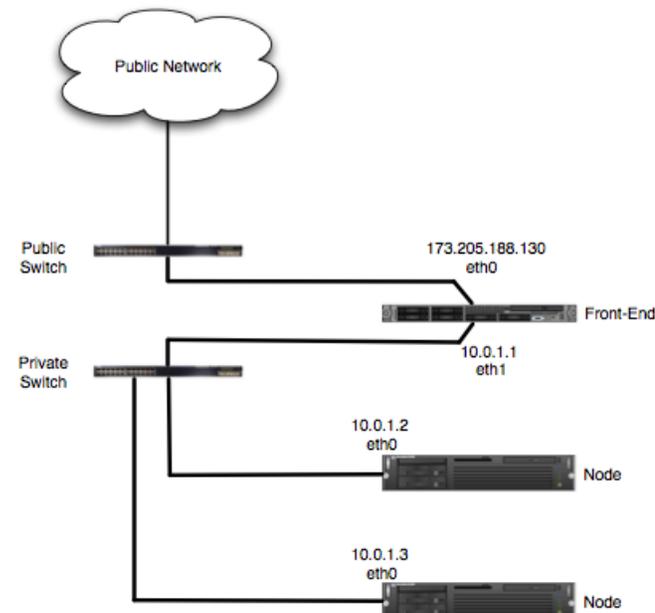
Eucalyptus Scalability: Load Testing

- Load tests were done to stress the software.
- Eucalyptus performed acceptably given enough time to complete requests
- Rapid churning (starting and stopping instances) gives Eucalyptus heartburn.
- Ran into hard limit on a single cluster controller
 - Somewhere between 750 and 800 running VMs
 - Caused by message size limitation in cloud and cluster controller communication protocol



Security: Network Security

- Eucalyptus network mode: MANAGED-NOVLAN
- VM network traffic masquerades as Cluster Controller
- By default, VMs can communicate with Node Controllers and other internal systems. **(BAD)**
- iptables rules on node controllers
 - prevents VMs from making unwanted connections
 - No impact to cloud operation



Security: IDS

- Risk areas identified for the VMs
 - Outside IPs scanning/attacking VMs
 - VMs scanning/attacking outside IPs
 - VMs running suspect services
- Eucalyptus MANAGED-NOVLAN network model provides suitable IDS access
- IDS watches internal Cluster Controller interface
- Monitors all inbound and outbound traffic to the VMs
- Also monitors communication between security groups
- Can not see VMs communicating within a security group.



Security: Image Security Concerns

- Users can upload and register customized disk images
- Sys Admins must register kernel and ramdisk images
- Uploaded images automatically made public
 - Users must choose to change permissions
 - Contents of image can be inadvertently leaked
- Users can upload compromised images
 - A myriad of ways to backdoor
 - Bucket naming is fairly open
 - This even happened accidentally
- Users can upload images with exploitable vulnerabilities
 - Every user is a sys admin
 - We can recommend but not require best practices



User Support

The image shows a composite of two web pages. The top-left portion is a dark blue banner for 'Magellan a cloud for science' with a navigation menu: Home, Architecture, Science, Cloud Research, User Support. Below this is a server rack image with the text 'Active Storage ~100 Compute/Storage Nodes; ~10TB FLASH/SSD Storage; ~500TB Disk Storage'. The bottom-left portion is a white sidebar with the Argonne National Laboratory logo and sections for 'About Magellan' and 'Our Goals'. The right portion is a screenshot of a Wiki page titled 'Main Page' for the 'Magellan Cloud Computing Project Wiki'. It includes a search bar, a navigation menu, and several content boxes: 'Getting Started on Magellan', 'Computing on Magellan', 'Support', 'Current Magellan Status', and 'Magellan News'. The 'Getting Started' box contains instructions for account creation and initial setup. The 'Computing on Magellan' box lists guides for working with VM images and IP addresses. The 'Support' box lists known issues and a discussion list. The 'Current Magellan Status' box states 'Magellan is up!'. The 'Magellan News' box lists recent updates like 'A script to set up MPICH2 is added'.

Magellan
a cloud for science

Home Architecture Science Cloud Research User Support

Active Storage
~100 Compute/Storage Nodes; ~10TB FLASH/SSD Storage; ~500TB Disk Storage

Scientists Look to the Clouds
Benefiting from mid-range computing resources and data-storage systems

Argonne
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navigation

- Main page
- Community portal
- Current events
- Recent changes
- Random page
- Help

search

Go Search

toolbox

- What links here
- Related changes
- Special pages
- Printable version
- Permanent link

page discussion view source history

Main Page

Welcome to the the Magellan Cloud Computing Project Wiki

- Getting started
- Community Resources
- Magellan Policies
- Magellan Website
- Magellan Web Management

Getting Started on Magellan

After your account is created on Magellan, visit the [Quickstart](#) guide to set up your local environment for accessing Magellan.
[Initial Setup](#) will guide you through installing additional tools to a VM image.

Computing on Magellan

Guides on working with Magellan:

- [Working with VM images](#)
- [Working with IP addresses](#)

Detailed listing of command line tools

- [List of Eucalyptus Commands](#)

See the [guide to Magellan IDs](#) to eliminate confusion identifying volumes, images, snapshots, etc.

Support

- [Known Magellan Issues](#)
- [Discussion List](#)

Current Magellan Status

- Magellan is up!

Magellan News

- [A script to set up MPICH2 is added](#)
- [Guide to MPI is added](#)
- [Quickstart assistance extended](#)



User Support

- We chose a community based support model
 - forums(still haven't found one everyone agrees on)
 - wikis
 - mailing lists
 - best effort documentation
- The difference between Job support and OS/VM support
 - the complexity is greatly increased
 - learning curve for users is steep
 - pre-built images do not always work without effort
 - Kernels
 - KVM vs. Xen
 - startup environment



Conclusions

- Works but still evaluating other solutions
 - Nimbus
 - OpenStack
- Don't believe the hype
 - every cloud stack has its qualities and faults
 - usage/API should help make the choice

