

Early study on NEuca & GENICloud

2011. 06. 02(Thu)
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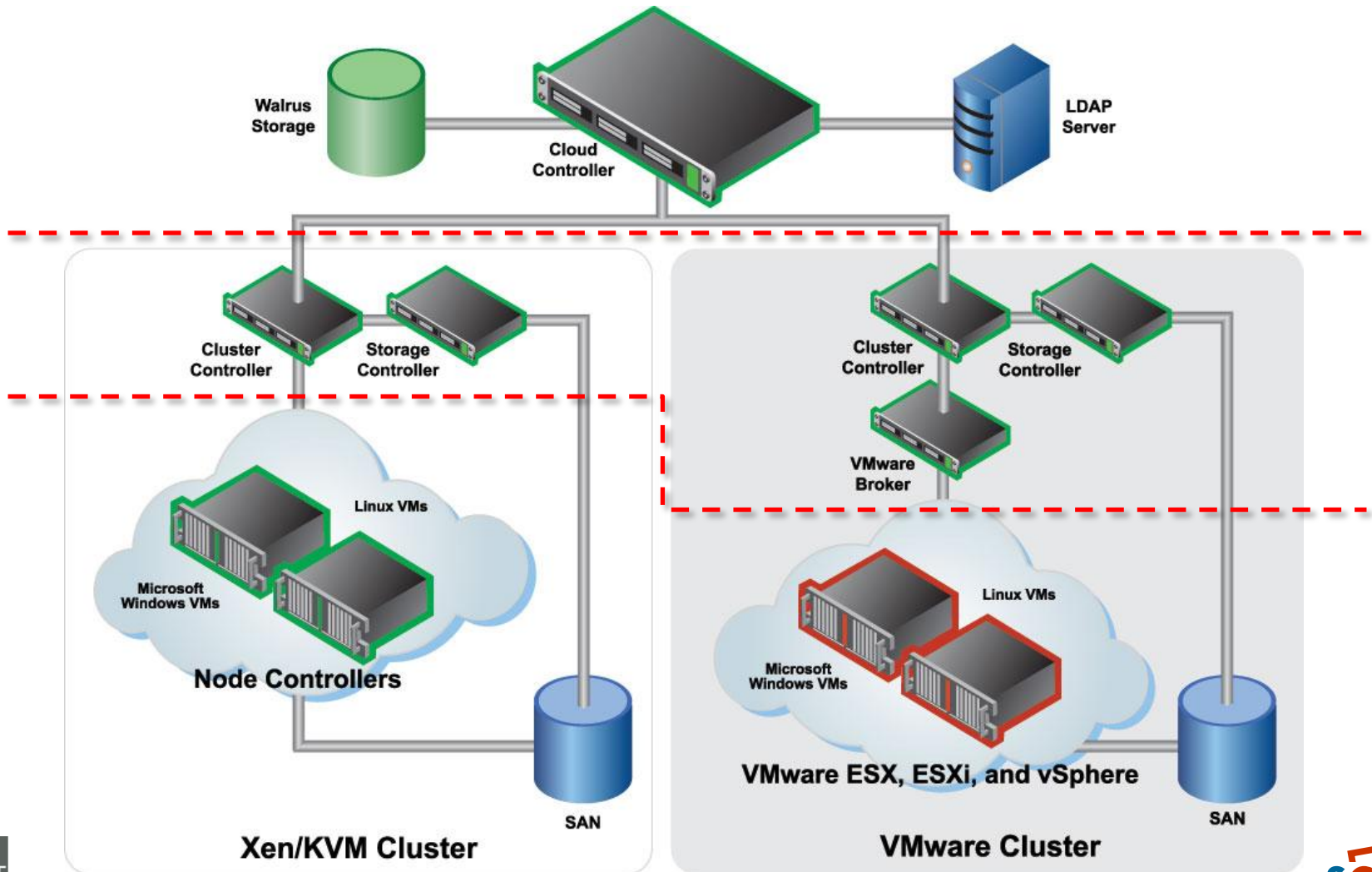
Agenda

- Eucalyptus
 - Eucalyptus Architecture
- GENICloud
 - Why PlanetLab and the Cloud?
 - GENICloud Architecture
 - Key Assumption of GENICloud
 - Milestones of GENICloud
- NEuca
 - Canonical NEuca network configuration

Eucalyptus

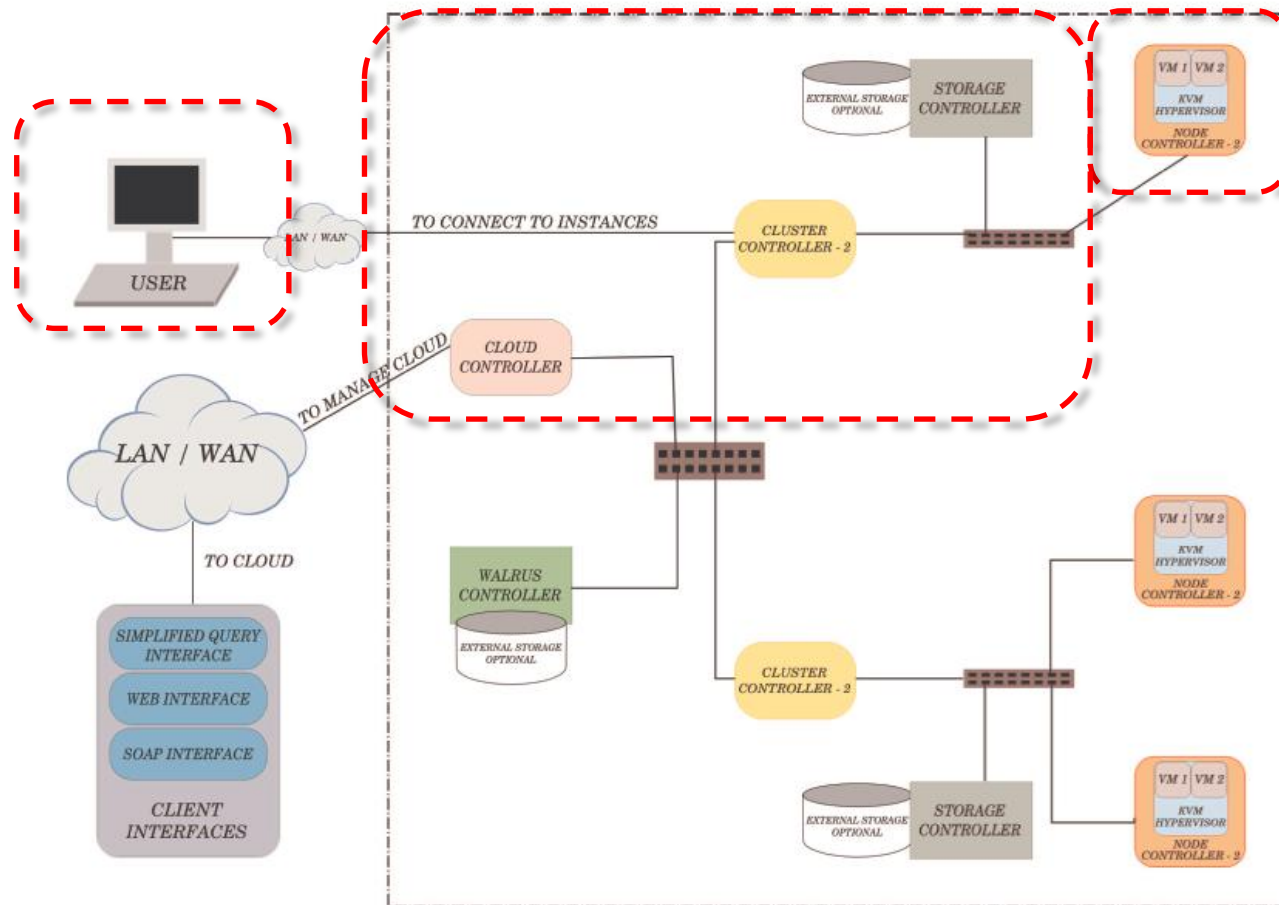
- Cloud Computing
 - Cloud computing is the access to computers and their functionality via the Internet or a local area network
 - X-as a Service: IaaS, PaaS, SaaS
 - Cloud Types: Public Cloud, Private Cloud, and Hybrid Cloud
 - Advantages: Self-service provisioning, Scalability, Reliability and fault-tolerance, Optimization/Consolidation, QoS, Well defined API, As-needed availability, ...
 - Gartner Group [1], NIST [2], CSA [3], ENISA [4]
- Eucalyptus: Open Source Cloud Platform [5]
 - Cloud Controller: high-level resource scheduling, system accounting, and web interface to outside
 - Walrus Storage: bucket-based storage
 - Cluster Controller: cluster-level scheduling and network control
 - Storage Controller: Elastic Block Store-style block-based storage
 - Node Controller: controlling the hypervisor

Eucalyptus Architecture



Eucalyptus - UEC

- Ubuntu Enterprise Cloud



GENICloud

- GENICloud - ProtoGENI
 - GENI/Eucalyptus Federated Resource Allocation a.k.a. GENICloud
- Scope
 - Envisage
 - Researchers constructing, deploying, and executing experiments on a variety of test infrastructures
 - **simultaneous use of both widely distributed sensing and actuating nodes and analysis nodes in large-scale cloud clusters**
 - Eucalyptus
 - Open-source software for building a cloud computing infrastructure.
 - The GENICloud project
 - **Build a GENI federation interface** for compute clusters running Eucalyptus
 - allow Eucalyptus clusters to federate via the **Slice-based Federation Architecture (SFA)**
 - spanning PlanetLab and multiple Eucalyptus
 - Anticipates devoting approximately 32 nodes at the HP Labs in order to gather data on cluster usage and resource usage

WHY PLANETLAB AND THE CLOUD?



- **Internet:**
 - set of standards and protocols which permit interconnection of independently-administered networks
 - Network of networks
- **Intercloud**
 - Term due to Greg Papadopoulos, defining infrastructure of 2010's and beyond
 - Set of standards and protocols which permit interconnection of independently administered clouds

	PlanetLab Facilities	Cloud
Strengths	<ul style="list-style-type: none"> • Broad global reach • Large (aggregate) bandwidth and low latency to everywhere 	<ul style="list-style-type: none"> • Large chunks of computation available
Weakness	<ul style="list-style-type: none"> • Not much computation available anywhere 	<ul style="list-style-type: none"> • Bandwidth limited to a few centers • Latency variable

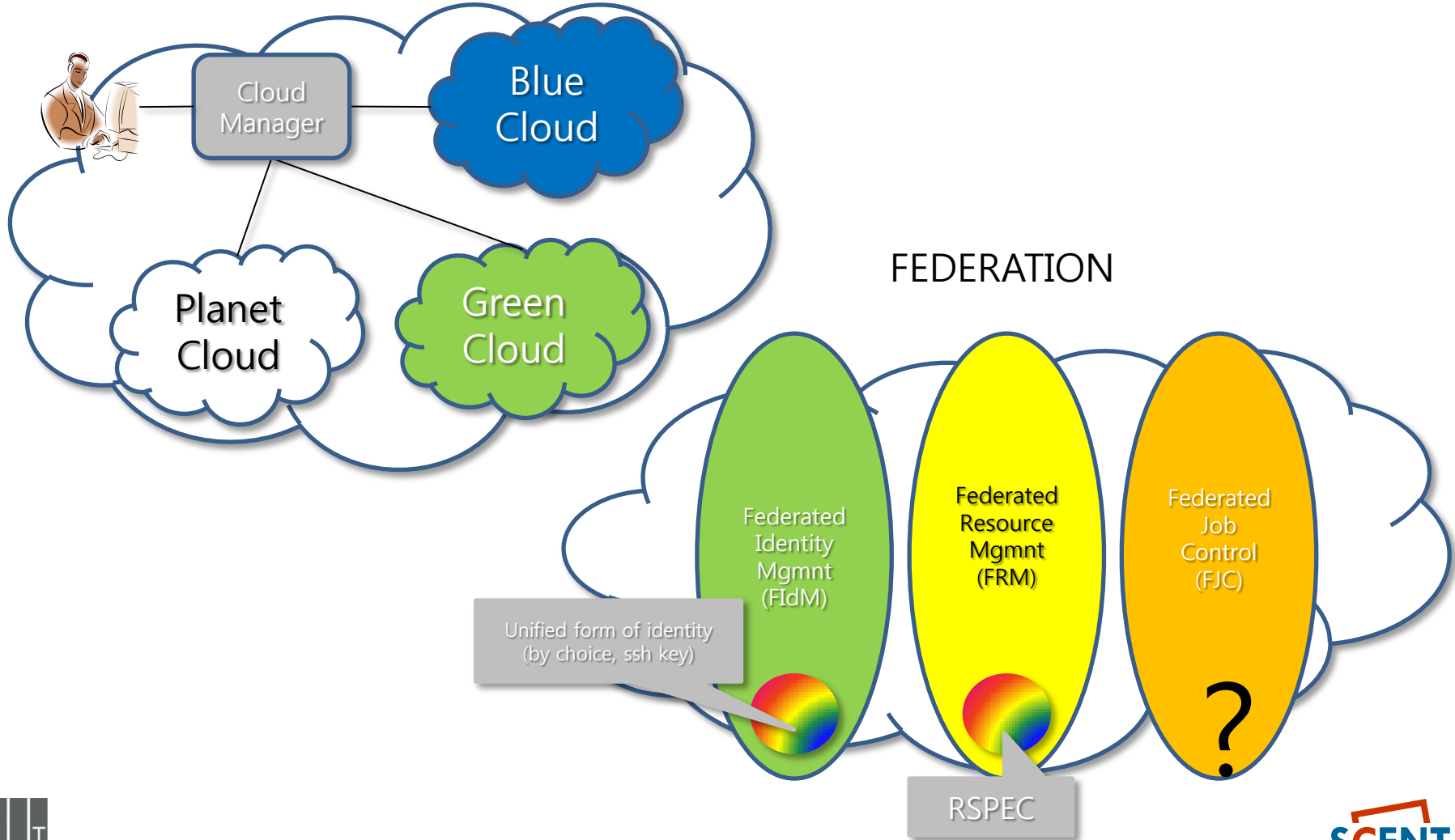


Network Virtualization

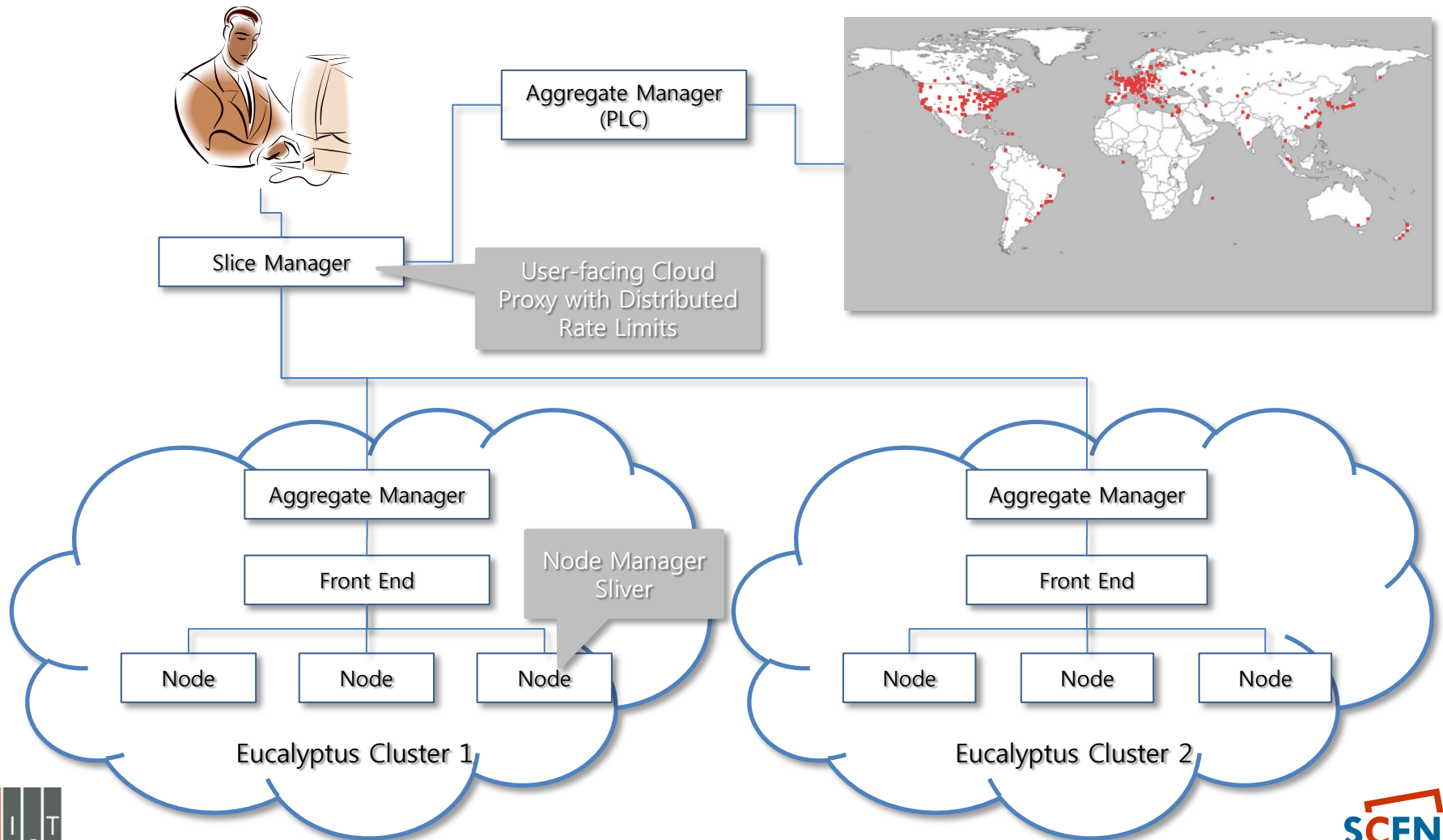


Computing Virtualization

ROLE OF THE CLOUD MANAGER



GENICloud Architecture



Key Assumption of GENICloud

- Each facility implements Slice-Based Facility Interface
 - Slice Facility Architecture
 - Means of creating/allocating slices
 - Authorization by sshkey (GID)
 - Delegation primitive (Create/instantiate slices, Upload images to slices, Execute jobs on slices, Cannot subdelegate)
 - Explicit costs/resource allocation primitives: Need to be able to control costs for the developer
- GENI standard for control frameworks
- Standard, unified means of allocating
 - Virtual machines at each layer of the stack ("slivers")
 - Networks/sets of virtual machines ("slices")
- Already supported by PlanetLab, ORCA based on Eucalyptus -> GEC 11

Milestones of GENICloud

- GENICloud S2.a Demo. at GEC7
 - Demonstrate the ability to configure slices on a Eucalyptus cluster using the SFA command-line tools.
 - Only support the "light" federation model and operate on a basic Eucalyptus RSpec resembling the PlanetLab Rspec
- GENICloud S2.b Plan for GUI
- GENICloud S2.c Demo. at GEC8
 - Demonstrate the ability to configure slices on multiple Eucalyptus clusters using a basic GUI.
 - Support both the light and full federation models
 - Eucalyptus Rspec is extended to enable the user to specify the disk image to load on a particular sliver and the virtual networking mode to use
- GENICloud S2.d Eucalyptus aggregate manager available to experimenters
 - Make Eucalyptus clusters available to GENI experimenters using the PlanetLab

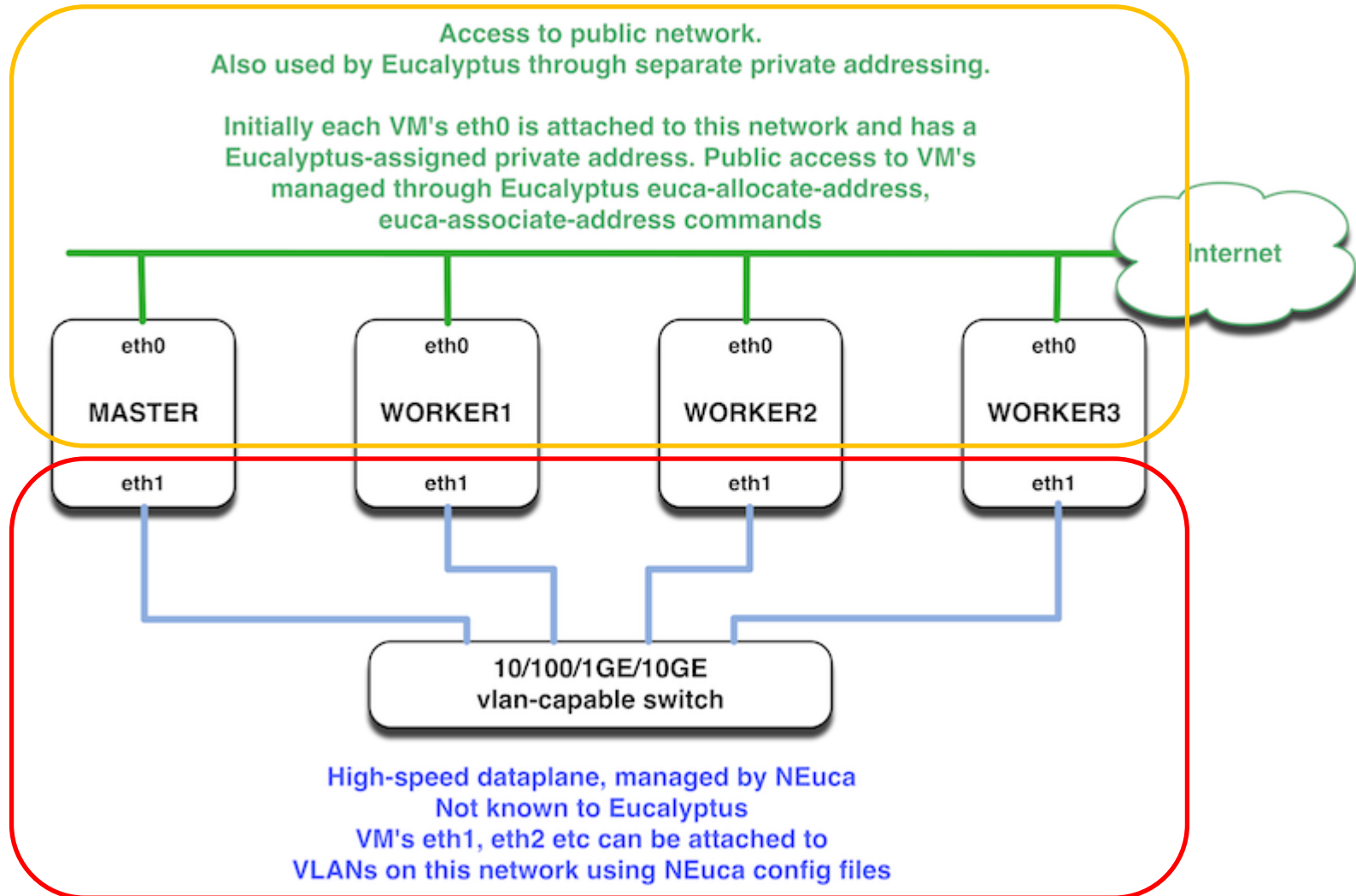
Milestones of GENICloud(2)

- GENICloud S3.a Demo. at GEC9
 - Demonstrate the use of GENICloud by a TransCoding application
- GENICloud S3.b Demo. at GEC10
 - Demonstration of GENICloud integration with GENI(implement the GENI API and recognize GENI credentials issued by GENI clearinghouses)
- GENICloud S3.c Demo. of the operational GENICloud aggregate and outreach at GEC11

NEuca

- NEuca [7] - ORCA
 - Network to Extensions to Eucalyptus
 - set of patches for Eucalyptus and guest configuration scripts
 - enhance the functionality of a private Eucalyptus cloud
 - without interfering with its traditional operations
 - NEuca allows VMs instantiated via Eucalyptus to
 - Have additional network interfaces, not controlled by Eucalyptus
 - Perform arbitrary post-boot actions using shell scripts
 - Install
 - Installing Eucalyptus with NEuca patches - (currently Eucalyptus 2.0.0 and 2.0.2)
 - Installing NEuca tools onto the images that the VMs will use in Eucalyptus

Canonical NEuca network configuration



NEuca(2)

- NEuca
 - Advantages:
 - Published **remotable** interfaces
 - **Multi-use infrastructure**: Utility computing, Cloud applications, IaaS, Experimentation
 - Makes easier to convince substrate owners to contribute **resources to GENI**
 - Key requirement
 - Ability to embed a topology into one or more cloud sites
 - Possible with XCat
 - Not possible with stock Eucalyptus
 - Usage
 - Create an .INI-formatted configuration file
 - Pass to the instance using `–user-data-file` option
 - File contains
 - Global definitions
 - Guest interface configuration
 - Shell script to be executed post-boot
 - Other extensions in near future (SSH proxy options)
 - NEuca-py tools installed on the image can help retrieve the information for use by applications

NEuca(3)



GENI experi
ment control
tool

Middleware API

Resource Provisioning Middleware

ORCA

Eucalyptus

XCat

BEN SA

ORCA BEN
Multi-layered
provisioning

Sherpa

OSCARS

Walrus

Storage

GENI AM APIs
Substrate APIs

Reference

1. Gartner Group
2. NIST, <http://www.nist.gov/>
3. CSA, <https://cloudsecurityalliance.org/>
4. ENISA, <http://www.enisa.europa.eu/>
5. Eucalyptus, <http://www.eucalyptus.com>
6. GENICloud,
7. NEuca - Network Extensions to Eucalyptus,
<http://groups.geni.net/geni/attachment/wiki/Gec9ControlFrameworkAgenda/GEC9-NEuca.pptx>
8. ORCA Status Report for Spiral 2 and Roadmap for Spiral 3 *GEC9*,
<http://groups.geni.net/geni/attachment/wiki/Gec9ClusterDAgenda/GEC9-cluster-D-ORCA-overview.pptx>

감사합니다.