



## MAGIC Meeting Minutes

February 4, 2015

### Attendees

Rich Carlson	DOE
Barb Hendrix	LBNL
Dan Katz	NSF
Kate Keahey	Un. Chicago
Ji Lee	NCO
Bryan Lyles	NSF
David Martin	Northwestern/Argonne
Grant Miller	NCO
Mike Nelson	Georgetown Un./CloudFlare
Robert Ricci	Un of Utah
Alan Sill	TTU
Derek Simmel	PSC

### Action Items

### Proceedings

This MAGIC Meeting was chaired by Rich Carlson of DOE and Dan Katz of the NSF... The meeting heard presentations On the two NSF Cloud Computing projects, CloudLab and Chameleon.

### CloudLab: Robert Ricci, Un of Utah

Clouds are changing the way scientists develop and use applications. Scientists and users need flexible, scalable scientific infrastructure enabling science in the cloud built by and for the research community. CloudLab is a meta-cloud for building clouds. It is agnostic to specific cloud software. It provides control and visibility all the way to bare metal. It is sliceable for supporting multiple isolated experiments at once. CloudLab is built upon Emulab and GENI providing access to diverse distributed resources. It provides repeatable resources. It has components at the Un. of Utah, Un. of Wisconsin, Clemson and GENI.

CloudLab enables exploring emerging and extreme cloud architectures, evaluating design choices of hardware and software, and geo-distributed data centers for low-latency applications.. It enables developing isolation models among tenants, quantifying resilience, diagnostic frameworks, and enables data intensive computing including real-time and near-real-time compute services. It enables research into:

- Resource allocation
- Big data frameworks
- Traffic engineering
- Tenant-facing abstractions
- Next-generation stacks
- Anomaly detection
- Security and isolation
- Composing services on heterogeneous clouds

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- Application-driven cloud architectures

CloudLab hardware includes one facility with one account at three locations with access to:

- 5000 cores at each of 3 sites
- 8-16 cores per node
- 4GB RAM/core
- 10 Gbps SDN to nodes, 100Gbps to Internet2 AL2S.

CloudLab is built on Emulab and GENI with several thousand users. It provisions and then turns over control to users. It is controllable through a Web interface and GENI. It provides a scientific instrument for repeatable research.

CloudLab supports US and international researchers. It is federated with GENI; GENI users can use it CloudLab users can use GENI. It supports wireless and mobile applications (WiMax and LTE). International partners include Europe (FIRE), Brazil, and Japan. There is an extensive community outreach to reach a wide range of applications and under-represented groups. CloudLab is currently available and its resources will be enlarged and completed in 2015.

CloudLab seeks guidance on:

- Where is cloud research going: applications, users, storage, hardware, new use cases, etc.
- Building profiles for cloud software stacks
- What metrics are needed to characterize performance
- Merging cloud and other computing paradigms.

For access to CloudLab please see:

[www.CloudLab.us](http://www.CloudLab.us)

For the complete briefing please see:

[https://www.nitrd.gov/nitrdgroups/index.php?title=Middleware\\_And\\_Grid\\_Interagency\\_Coordination\\_\(MAGIC\)#title](https://www.nitrd.gov/nitrdgroups/index.php?title=Middleware_And_Grid_Interagency_Coordination_(MAGIC)#title) under Meetings, January 2015.

### **Chameleon: Kate Keahey**

Chameleon is a large-scale reconfigurable experimental environment for cloud research. It is scalable to address big data volume, velocity, and variety, to support big instruments, and to provide big compute resources. It is:

- Large scale: 650 nodes; 14500 cores, 5 PB disk, 100G networking
- Reconfigurable
- Connected: One-stop shopping for experimental needs
- Complementary: Coordinates with GENI, Grid'5000 and other experimental testbeds

Chameleon hardware includes 504 x86 compute servers, 48 distributed storage servers, 102 heterogeneous servers, 15 management and storage nodes tied together with 100Gbps networking. Chameleon supports:

- Persistent, reliable shared clouds: New model development; algorithms, platforms, auto-scaling hardware, etc.
- Isolated partition and Chameleon appliances for repeatable experiments
- Virtualization technology, systems networking, infrastructure-level resource management, etc.

Chameleon software enables:

- Persistent clouds and user clouds

- Chameleon appliance catalog
- Discovery, provisioning, configuration, and monitoring

Experimental workflow support is provided in discovering resources, provisioning resources, configuring and interacting with resources, monitoring. Supporting services include:

- Catalog of actual testbed resources: fine-grained, parsable, versioned, dynamically verifiable
- Resource catalog: Grid'5000 registry, G5K-checks
- Provisioning resources: Resource leases, multiple environments in one lease, advanced reservation
- Configure and interact: map multiple applications to a lease, snapshotting, handle complex appliances, interaction to reboot, power on/off, shaping experimental conditions
- Monitoring: user resource monitoring, infrastructure, custom user metrics

Networking resources include SDN, OpenFlow, etc., 100Gbps networks, integration with GENI.

Education and outreach resources are provided to broaden the user base and to educate users on Chameleon resources and capabilities. Links to industry are fostered. An annual Chameleon workshop will be held to inform and share experimental techniques solutions and platforms and to showcase research.

An initial reconfiguration capability will soon be available on FutureGrid UC&TACC resources for early users. For the full briefing please see:

[https://www.nitrd.gov/nitrdgroups/index.php?title=Middleware And Grid Interagency Coordination \(MAGIC\)#title](https://www.nitrd.gov/nitrdgroups/index.php?title=Middleware%20And%20Grid%20Interagency%20Coordination%20(MAGIC)#title) under Meetings, January 2015.

#### **Upcoming Meetings:**

March 23-26: GEC22, US Ignite, OGF43, GLIF, Washington DC

May 21-22: OGF44, Lisbon, Portugal

June 16, 2015: Portland, Oregon Workshop: Science of Cyberinfrastructure: Research, Experience, Applications and Models (SCREAM) In conjunction with HPDC'15.

<https://sites.google.com/site/scream15workshop/>

#### **Next MAGIC Meetings:**

March 4, 2015, NSF

April 1, 2015, NSF