CHAMELEON:
A LARGE-SCALE, RECONFIGURABLE EXPERIMENTAL ENVIRONMENT FOR CLOUD RESEARCH

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CHAMELEON: A FLEXIBLE AND POWERFUL EXPERIMENTAL INSTRUMENT

- **Large-scale**: “Big Data, Big Compute, Big Instrument research”
  - ~650 nodes (~14,500 cores), 5 PB disk over two sites, 2 sites connected with 100G network
- **Reconfigurable**: “As close as possible to having it in your lab”
  - Bare metal reconfiguration, single instrument, Chameleon appliances
  - Support for repeatable and reproducible experiments
- **Connected**: “One stop shopping for experimental needs”
  - Workload and Trace Archive
  - Partnerships with production clouds: CERN, OSDC, Rackspace, Google, and others
  - Partnerships with users
- **Complementary**: “Can’t do everything ourselves”
  - Complementing GENI, Grid’5000, and other experimental testbeds
CHAMELEON HARDWARE

Switch
Standard Cloud Unit
42 compute
4 storage
x2

Switch
Standard Cloud Unit
42 compute
4 storage
x10

Core Services
Front End and Data Mover Nodes

Core Services
3.6 PB Central File Systems, Front End and Data Movers

Chameleon Core Network
100Gbps uplink public network (each site)

To UTSA, GENI, Future Partners

504 x86 Compute Servers
48 Dist. Storage Servers
102 Heterogeneous Servers
16 Mgt and Storage Nodes

Heterogeneous Cloud Units
Alternate Processors and Networks

SCUs connect to core and fully connected to each other

Chicago
Austin

www.chameleoncloud.org
## CAPABILITIES AND SUPPORTED RESEARCH

<table>
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<tr>
<th>Development of new models, algorithms, platforms, auto-scaling HA, etc., innovative application and educational uses</th>
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<tbody>
<tr>
<td><strong>Persistent, reliable, shared clouds</strong></td>
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<td>Repeatable experiments in new models, algorithms, platforms, auto-scaling, high-availability, cloud federation, etc.</td>
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<td><strong>Isolated partition, Chameleon Appliances</strong></td>
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<td>Virtualization technology (e.g., SR-IOV, accelerators), systems, networking, infrastructure-level resource management, etc.</td>
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| **Isolated partition, bare metal reconfiguration: OpenStack and Grid’5000**}
PROJECT SCHEDULE

- **Now**: FutureGrid@Chameleon
  - Chameleon Technology Preview
  - OpenStack cloud
  - 43 projects, 81 users, 29 institutions

- **Summer 2015**: New hardware: large-scale homogenous partitions available to Early Users

- **Fall 2015**: Large-scale homogenous partitions and bare metal reconfiguration generally available

- **2015/2016**: Refinements to experiment management capabilities, higher level capabilities

- **Fall 2016**: Heterogeneous hardware available
GET ENGAGED

- [www.chameleoncloud.org](http://www.chameleoncloud.org)
- “Stay in touch”
- FutureGrid@Chameleon
- Technology Preview on FutureGrid hardware
- Early User Program
  - Committed users, driving and testing new capabilities, enhanced level of support
  - Sign up later today and try out Technology Preview in April
THE TESTBED IS THERE – “JUST” ADD RESEARCH!

- Large-scale, responsive experimental testbed
  - Targeting critical research problems at scale
- Reconfigurable environment
  - Support use cases from bare metal to production clouds
- One-stop shopping for experimental needs
  - Trace and Workload Archive
- Engage the community
  - The most important element of any experimental testbed is users and the research they work on