Chameleon

www. chameleoncloud.org

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

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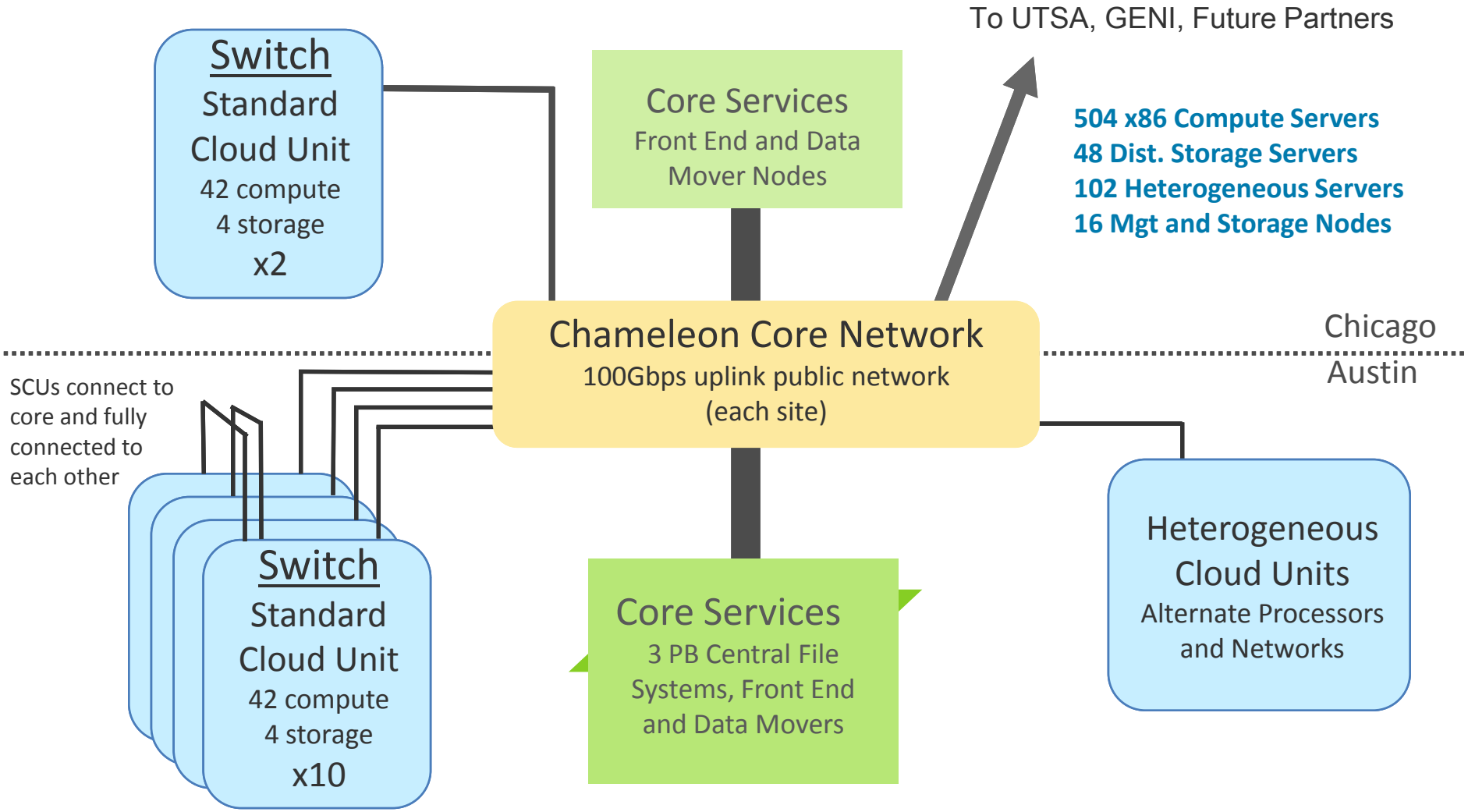
CHAMELEON: A POWERFUL AND FLEXIBLE EXPERIMENTAL INSTRUMENT

- Large-scale instrument
  - Targeting 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 instrument
  - Bare metal reconfiguration, operated as single instrument, graduated approach for ease-of-use
- Connected instrument
  - Workload and Trace Archive
  - Partnerships with production clouds: CERN, OSDC, Rackspace, Google, and others
  - Partnerships with users
- Complementary instrument
  - Complementing GENI, Grid'5000, and other testbeds
- Sustainable instrument
  - Industry connections

CHAMELEON HARDWARE



CAPABILITIES AND SUPPORTED RESEARCH

Development of new models, algorithms, platforms, auto-scaling HA, etc., innovative application and educational uses

Persistent, reliable, shared clouds

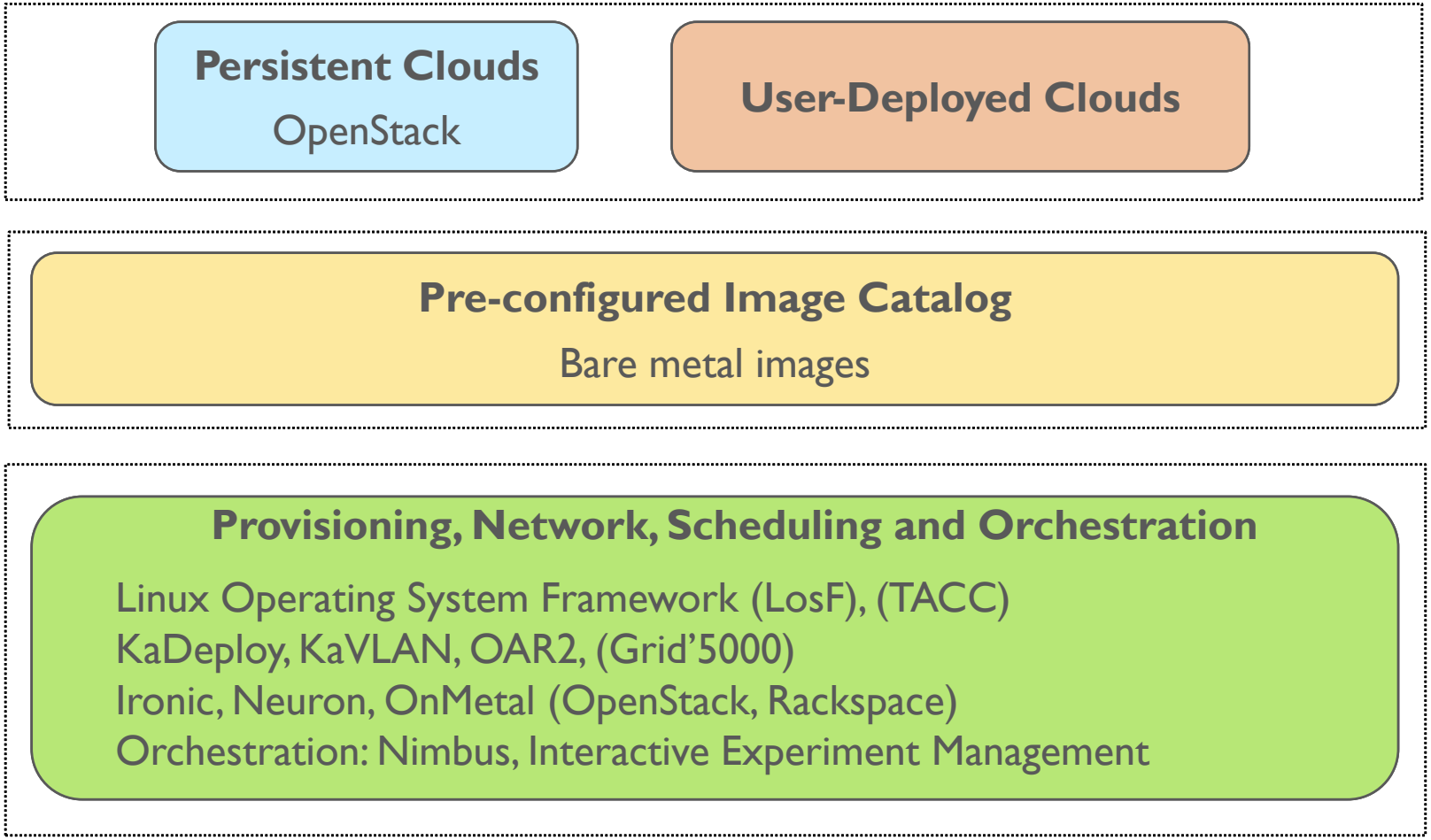
Repeatable experiments in new models, algorithms, platforms, auto-scaling, high-availability, cloud federation, etc.

Isolated partition, pre-configured images reconfiguration

Virtualization technology (e.g., SR-IOV, accelerators), systems, networking, infrastructure-level resource management, etc.

Isolated partition, full bare metal reconfiguration

SOFTWARE: CORE CAPABILITIES



EXPERIMENT WORKFLOW

- User interface: log in, manage profile
- Find Resources
  - Machine-parsable description (JSON)
  - Versioning (hardware upgrades, etc.)
  - Verification (maintenance, failures, etc.)
- Reserve Resources (browsing vs matching)
- Reconfigure testbed
- Shape experimental conditions
- Monitoring and metrics
  - Including fine-grain and energy monitoring
- Integration with workload generators, simulation, etc.

OUTREACH AND ENGAGEMENT

- Early User Program
  - Committed users, driving and testing new capabilities, enhanced level of support
- Chameleon Workshop
  - Annual workshop to inform, share experimental techniques solutions and platforms, discuss upcoming requirements, and showcase research
- Advisory Bodies
  - Research Steering Committee: advise on capabilities needed to investigate upcoming research challenges
  - Industry Advisory Board: provide synergy between industry and academia

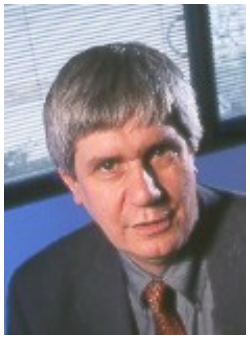
PROJECT SCHEDULE

- Fall 2014: FutureGrid resources at UC and TACC available as OpenStack clouds
- Spring 2015: Initial bare metal reconfiguration capabilities available on FutureGrid UC&TACC resources for Early Users
- 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
- Fall 2016: Heterogeneous hardware available

TEAM

Kate Keahey
Chameleon PI
Science Director

Paul Rad
Industry Liason



Joe Mambretti
Programmable networks

Warren Smith
Director of Operations

DK Panda
High-performance networks

Dan Stanzione
Facilities Director

PARTING THOUGHTS

- Large-scale, responsive experimental testbed
  - Targeting critical research problems at scale
  - Evolve with the community input
- Reconfigurable environment
  - Support use cases from bare metal to production clouds
  - Support for repeatable and reproducible experiments
- One-stop shopping for experimental needs
  - Trace and Workload Archive, user contributions, requirement discussions
- Engage the community
  - Network of partnerships and connections with scientific production testbeds and industry
  - Partnerships with existing experimental testbeds
  - Outreach activities
- Come visit us at www.chameleoncloud.org!