# Open Cloud Testbed: Developing a Testbed for the Research Community Exploring Next-Generation Cloud Platforms

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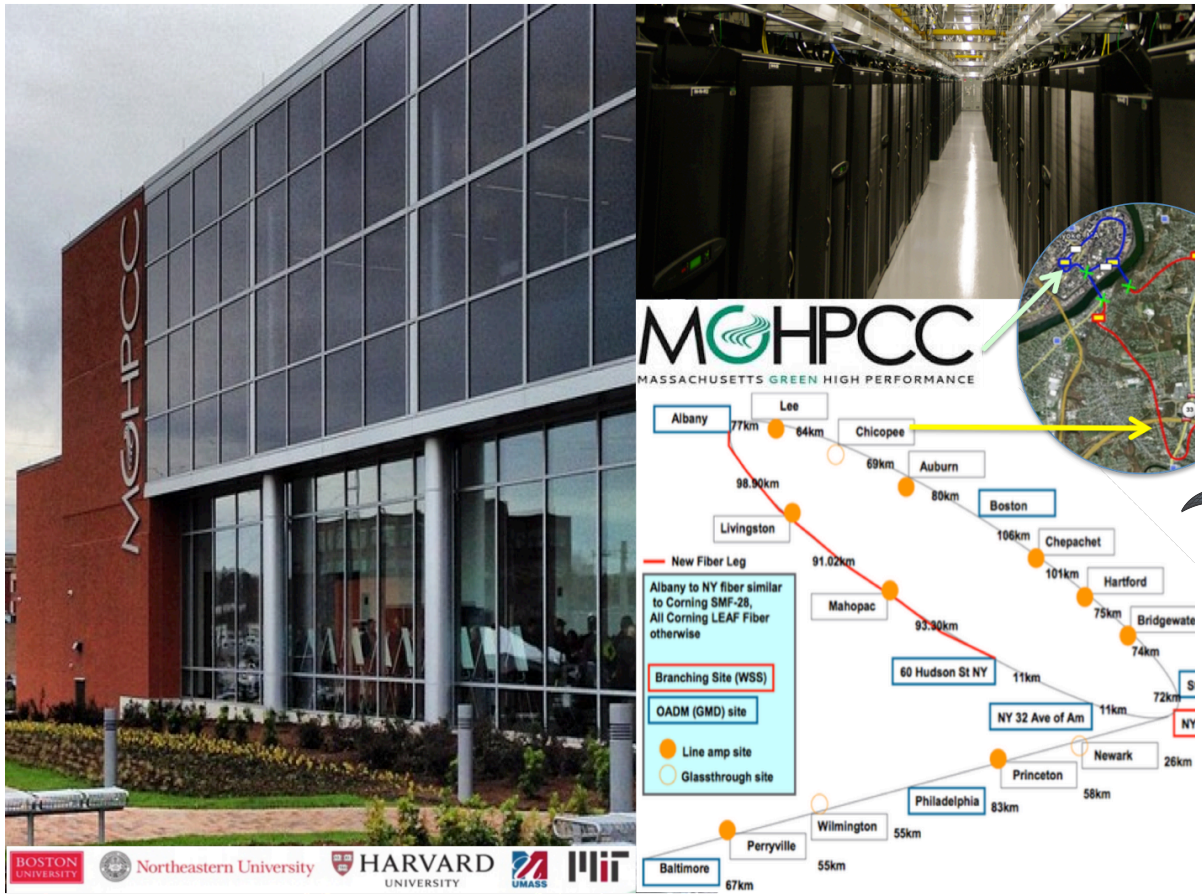
# What is MGHPCC?




MOC

geni
Exploring Networks of the Future

FABRIC

# What is MOC?

HARVARD Dataverse

OPEN DATA HUB
AI Platform powered by Open Source

Red Hat
Two Sigma
Lenovo
Dell
Intel
Cisco
IBM
Harvard IQSS

openstack.

RED HAT OPENSHIFT Container Platform

ceph

Elastic Secure Infrastructure

**1+ PB**

**2500 cores, ~40TB RAM**

**400** Power9 Cores, **40** GPUs, **5**TB RAM

New North East Storage Exchange (NESE)

- 20 PB + file system & Object storage
- Massive data lake for region, co-located with MOC
- Fraction of the cost of AWS S3

ceph

**20+ PB**

# What is CloudLab?

CloudLab

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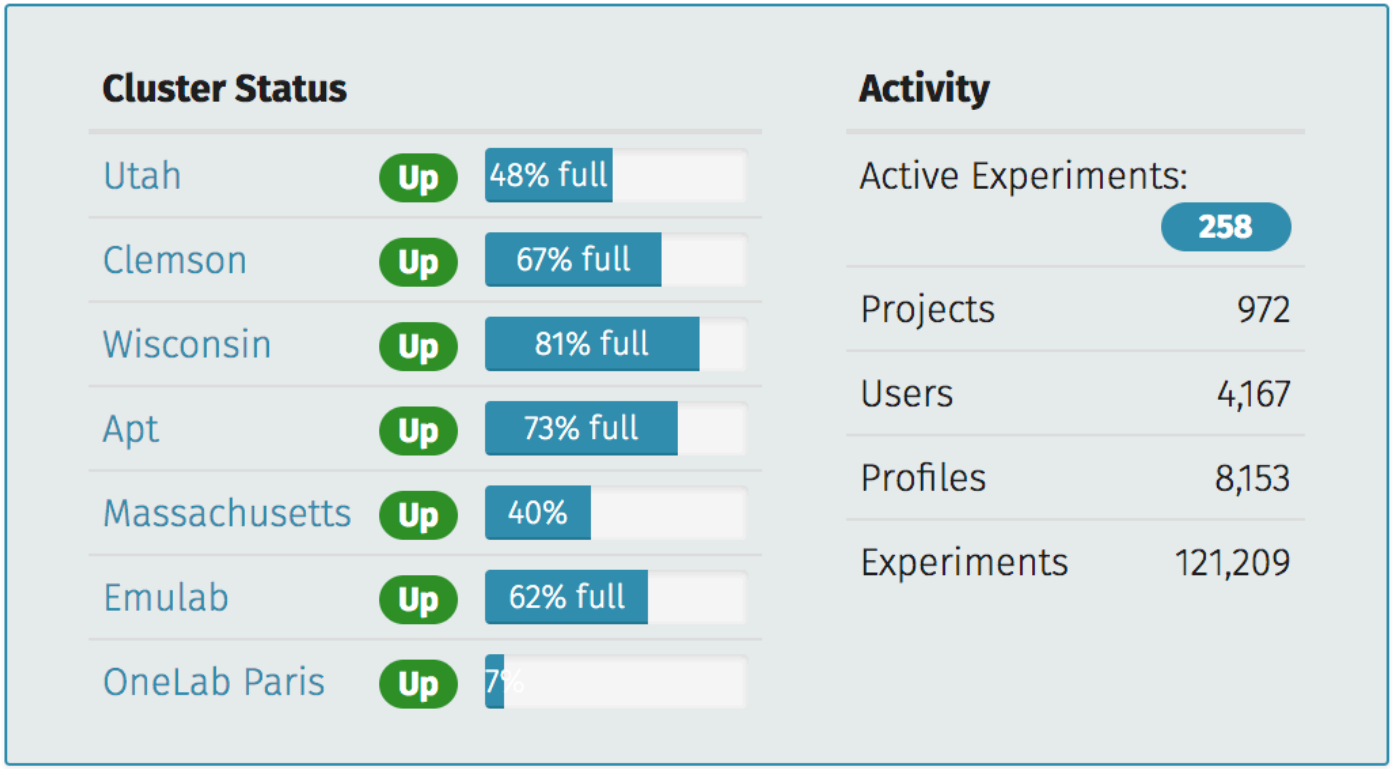
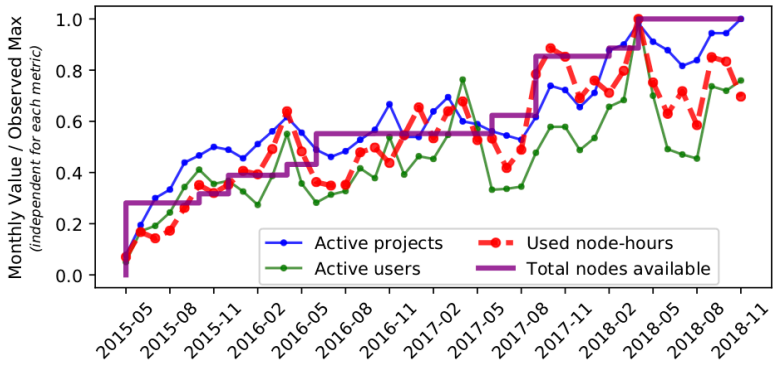


# Motivation

- Cloud computing plays an important role in supporting most software we use in our daily lives
- Critical for enabling research into new cloud technologies (see demand for CloudLab and Chameleon)
- Demand for cloud testbeds higher than available resources



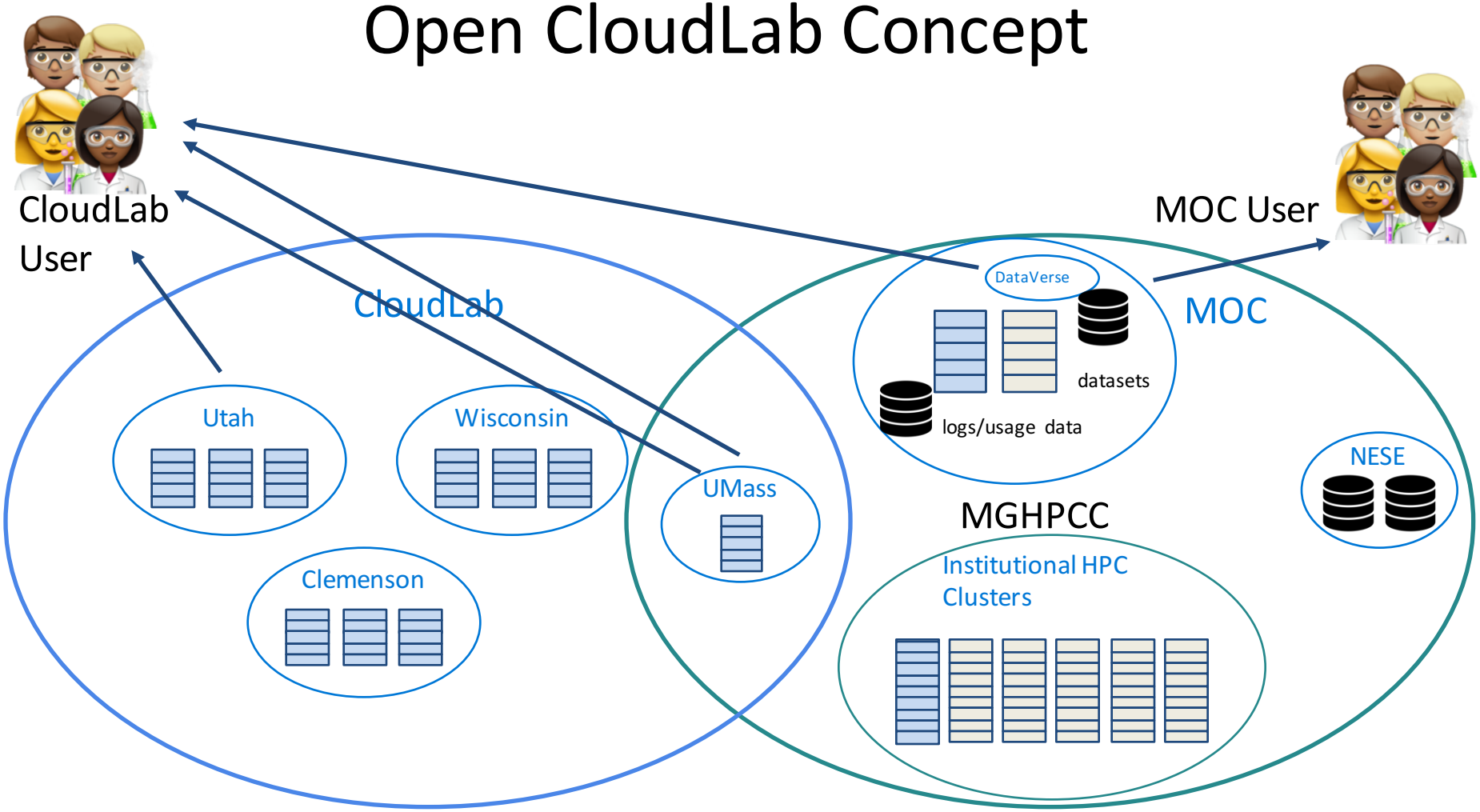
# Motivation

- CISE researchers want to study users that are not CISE
- MOC supports:
  - real users
  - access to real data sets
  - can provide traces of real usage
  - can allow services to be exposed to end-users (e.g., TTP)
  - has access to production services at scale (e.g., NESE)
  - infrastructure and services provided by industry partners

# Open Cloud Testbed

- A testbed for research and experimentation into new cloud platforms
- Combine proven software technologies with a real production cloud
- Enhanced with programmable hardware (FPGA) capabilities; bump-in-the-wire (BITW); ~30 nodes

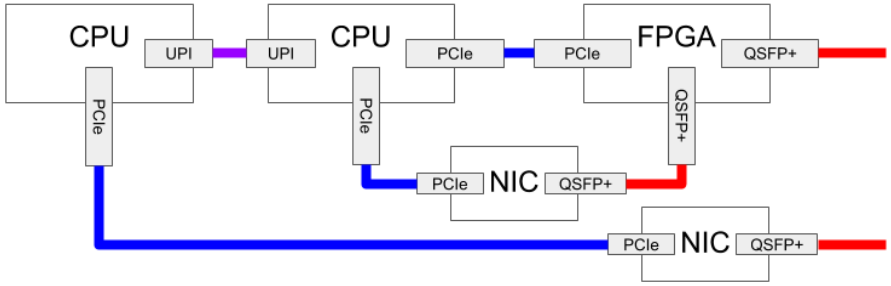
# Open CloudLab Concept



# CISE Community Outreach

- MOC workshop - 100s researchers from region
- Enables IT team to support, arguably for the first time, CISE researchers:
  - integration into buy-in programs
  - support by IT facilitators
- Collaborate with Northeast Cyberteam for reaching out to smaller institutions
- Replicated to other regions as successful
  - RedHat is working with Technion and Brno to replicate the MOC: work would enable other regions nationally
  - Cloud Lab data centers would be the next natural centers

# FPGAs




- Research enabled
  - Cloud and Operating System: BITW processing in cloud and operating systems.
  - FPGA systems: Support for dynamic reconfiguration, multitenancy, elasticity, and security
  - FPGA-related tools and middleware: Augmentations to High Level Synthesis tools (e.g., auto-tuning OpenCL) and support for middleware that exploits FPGAs
  - Provider applications: SDN, streaming compression, encryption, and data transformations
  - Tenant applications: take advantage of the network-side position of the accelerator and low-latency communication

# Core Team