What is PRObE?
PRObE is a systems research center dedicated to large scale systems research. It is made possible by funding from the National Science Foundation. Today, PRObE provides several clusters, the largest at about 1000 nodes, and the newest with 34 bleeding edge 64-core machines with GPU’s, SSDs, and 40GbE and FDR Infiniband networks. Clusters are available to researchers free of charge. In order to get access, researchers need to apply for a project and their students or collaborators can then join that project once it has been approved. All clusters are managed using the Emulab software suite.

Current research conducted on PRObE
The PRObE committees screen all projects before they are approved before time on the machines are allowed. The committees are made up of leading systems researchers from Academia, Industry, and Government. Currently ~45 projects are doing active work across the clusters, and topics range from distributed operating systems and file systems, to schedulers, and exascale software systems. Examples of projects are available from our webpage. Several papers using PRObE have already been published and the list is growing.

SC’13 PRObE Contacts & Events
If you have questions about PRObE and its usage, please feel free to contact Andree Jacobson, Computer and Information Systems Manager at the New Mexico Consortium – andree@newmexicoconsortium.org, or come and visit the UNM booth (#1732) for a demo and quick introduction to PRObE on Tuesday, Nov 19 at 1.30pm or Wednesday, Nov 20 at 1.30pm. Space is limited and available on a first-come-first-served basis so be sure to arrive on time. For general questions on PRObE, please refer to our webpage http://www.nmc-probe.org/ or send an email to probe@newmexicoconsortium.org.

Links of interest
- PRObE Website: http://www.nmc-probe.org/
- FAQ: https://www.nmc-probe.org/wiki/FAQ
- Emulab: http://www.emulab.net/

This material is supported in part by the National Science Foundation under awards CNS-1042537 and CNS-1042543 (PRObE). http://www.nmc-probe.org/
About PRObE
- Repurposes large decommissioned computer systems, primarily from Los Alamos National Laboratory
- Highly reconfigurable, remotely accessible and controllable environment (research instrument) dedicated to systems research, including Operating Systems, Storage, Resilience, and High End Computing.
- Researchers have complete remote control of cluster resource (hardware and software) while running experiments, and can visit the center if physical access is preferred.
- Enables fault injection, deep instrumentation, and failure statistics collection.
- End-of-life destructive testing.
- Supports parallel and data intensive workloads
- Several clusters varying in size and architecture are available for use
- The PRObE research environment is based on Emulab software

Environmentally friendly
- Energy efficient 320 ton MultiStack chillers with free cooling units and MagLev compressors
- Free cooling: Outside air is used to cool chill water when the temperature is cold enough – in Los Alamos is several months/year. Varying PUE .04 - .5
- First installation in NM, and at this altitude (7500 ft)
- Seven 50-ton CRACs cool two server rooms totaling 2750 ft²
- 2000 kVA Transformer makes PRObE 2nd largest power consumer in the county.

Current Machines
- **Susitna** 34 nodes, 4x16core AMD Opteron (64 cores), 128GB RAM, 7TB Disk + 64GB SSD, 40GbE + FDR Infiniband
- **Marmot** 128 nodes, 2x1 core AMD Opteron, 16 GB RAM, 2TB Disk, Dual Ethernet + SDR IB (Staging cluster)
- **Kodiak** 1000 nodes, 2x 1 core AMD Opteron, 8GB RAM, 2x1TB Disk, Ethernet + SDR IB

Current projects
- PRObE currently host researchers on more than 45 different projects
- Topics span the entire systems research arena, including distributed file systems, data intensive scheduling, exascale software systems, resilience, and cloud systems.
- To date, Kodiak has provided close to 5M CPU hours to projects.

More information
- [probe@newmexicoconsortium.org](mailto:probe@newmexicoconsortium.org)

Getting access
- NSF’s “who can apply” rules
- [http://www.nmc-probe.org/request](http://www.nmc-probe.org/request) for large allocations on any machine

Planned Machines
- **Nome** 100+ nodes, 4x Dual core AMD Opteron (8 cores), 16GB RAM, 2x1TB, Dual Ethernet + SDR Infiniband (Available Spring 2014)
- **Naknek** 100-200 nodes, 4x Quad core AMD Opteron (16 cores), Dual Ethernet, DDR Infiniband (Avail. Fall/Winter 2014)

Summer school
- Highly-selective, 9-week program designed for third year (i.e., Junior) undergraduates, although Sophomores and Seniors are also considered.
- Students work in small project teams to execute real-world projects on computer clusters that they have assembled and configured.
- A highly experienced instructor provides class instruction and mentoring
- Subject matter experts from Los Alamos National Laboratory mentor team projects presented at a technical symposium at the conclusion of the Summer Institute

SC’13 Contacts
- Andree Jacobson, New Mexico Consortium andree@newmexicoconsortium.org
- Garth Gibson, Carnegie Mellon University garth@cs.cmu.edu

This material is supported in part by the National Science Foundation under awards CNS-1042537 and CNS-1042543 (PRObE). [http://www.nmc-probe.org/](http://www.nmc-probe.org/)