The Cyberinfrastructure Gap in Puerto Rico

How big is it?

How can we close it?

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The state of CI in PR

Several separate test-beds for CI exist in PR:

- HPCf BiRC/NaRC
- UPR-RRP CNNET
- UPR-RUM PDCLab
- Arecibo Radio Observatory

Slowly growing network for higher education

- UPR Internet2
- AABRE institutions
- Sponsorship of PRREN

The elements of CI planning in PR

- Researchers
- Common Goals
- Applications
- Resources
- Internal Communications
- Obstacles

Researchers

- Limited recruiting of computing and networking researchers, principally in CISE program.
- New hires not directly working with CI.
- Some existing faculty experimenting with CI.
- Computational scientists actively recruited, particularly in Nanomaterials, bio-nano.

Common Goals

Limited work towards common pre-CI goals, in particular, Internet2, high-performance computing. Overcoming barriers to inter-institutional cooperation difficult.

Applications

- PDCLab
- WALS-AIP: automated processing of signal-based information arriving from physical sensors in a generalized wide-area, large-scale distributed network.
- Cyber-CIP (CI-TEAM): CI for collaborative Information Processing; UPR-RUM, Florida International University, U. Alabama Birmingham, Mississippi State, Turabo, Polytecnica.
- STB: Low-power radar testbed, uses Distributed Colaborative Adaptive Sensing (DCAS) approach. Driven by students from University of Massachusetts, University of Puerto Rico, University of Oklahoma and Colorado State University.

Applications

eVLBI a collaboration of the major radio astronomical institutes in Europe, Asia, South Africa, Australia, South America and PR and performs real-time high angular resolution observations of cosmic radio sources.

CNNet Condor deployment on 190+ student workstations provides computing cycles for fuel cell development, quantum computing, Bayesian statistics, nanostructured materials, communication codes, and other fields.

Resources

- HPCf
  - 155 Mbps network for Internet2
  - Connects all UPR campuses
  - Arecibo Radio Observatory
  - Several supercomputers
  - cafeina - 32 processor SGI Origin 300
  - gelato - 3 node, 36 processor SGI Altix
  - 32-bit and 64-bit linux clusters
  - espresso - 32 bit, 85 node dual Xeon
  - barista - 64-bit, 5 node, 16 core Opteron

Resources

- PDCLab
  - 65 2-Way SMP Intel Pentium III cluster
  - eight IA-64 Itanium servers
  - 4TB storage capacity
- CNNet
  - 190+ workstation opportunistic cluster

Obstacles

1. high cost of networking
2. lack of technical support
3. loss of human resources
4. low interest in computational science community
5. no CI community

What can PR do to close the CI gap?

- Resource Center for Science and Engineering
  - Improve communications
  - Leverage federal funding
  - Support HPCf
- HPCf
  - Host BiRC/NaRC
  - Manage Internet2
  - Train staff/students
  - Partner with stateside institutions

What can PR do to close the CI gap?

- EPSCoR Institute for Functional Nanomaterials
  - Computational Nanoscience Resource Center
  - Hire 2 computational nanoscientists
  - Partner with Purdue NCN and NanoHUB
- NIH INBRE Bioinformatics Resource Center
  - Bioinformatics Resource Center
  - Expansion of networking capability at AABRE members
- Internet2 expansion
  - Expansion to 512 Mbps
  - Sponsorship of other institutions
  - Planning for 10 Gbps