Rutgers Cyberinfrastructure Roadmap

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oarc.rutgers.edu
Vision

• To make Rutgers a nationally and internationally recognized leader in and provider of advanced computing/cyberinfrastructure (ACI)

Mission

• To provide strategic leadership in advancing Rutgers University’s research and scholarly achievements on all campuses through next generation computing, data science, networking, and creative learning environments in partnership with the Office of Research and Economic Development, the Office of Information Technology, and academic and research communities, both internal and external.
Goals

- Grow, develop, design, and build a world class One-Rutgers ACI ecosystem to meet current and future needs of the research community across all campuses
- Grow and develop an ACI education, outreach, and training program
- Offer user, application, and system support on OARC maintained resources so as to meet the needs of the Rutgers research communities on all campuses
- Build an environment that fosters collaboration between diverse communities both internal and external
- Identify new cyberinfrastructure funding opportunities and projects to foster sustainability, growth, and innovation. We will partner with faculty, not compete.
- Present IT as a strategic asset rather than a utility
- Develop cloud strategies to create new opportunities for the Rutgers community (includes OSG, XSEDE, AWS, Azure, Google)
- Align OARC projects and priorities with Rutgers University goals, priorities, and mission
- Increase university and industry partnerships
OARC Offers Rutgers Community:

- Neutral territory that can facilitate discussions across multiple domains to help researchers be more productive with local and national cyberinfrastructure ecosystems (e.g. OSG, XSEDE, CloudLab, GENI)
- Access to research scientists with domain knowledge and technical expertise
- Consulting
  - Workflows, software, optimization, and infrastructure
  - Cloud solutions
- Grants
  - Boiler plate information on resources, infrastructure, people
  - Team members can (and encouraged) to be included on proposals
- Access to the advanced computing resources
  - With full OARC system and application support
- Installation of applications
  - Porting codes, compiling, debugging
- ACI Education, Outreach and Training
- Liaison between research community and IT
• **Amarel Condominium model (Centralized System)**
  - A heterogeneous advanced computing environment designed to handle:
    - Traditional HPC
    - High Throughput Computing (HTC)
    - Data Analytics
    - Large memory systems
    - Virtualization
    - Accelerators (GPGPU, XEON PHI, FGPA)
    - Edge devices
  - Free to Rutgers community
    - Basic level of priority (backfill)
  - Nodes for purchase (by faculty, departments, colleges)
    - Have owner (highest) priority
    - Good for 4 - 5 years depending on warranties
    - Priority access based on number purchased
    - Designed to feel as local as possible (preserves idea of ownership)
      - Owners can preempt non-owners immediately (based on purchased resources)
      - Owners will have their own queue and manage allocations for that queue
        » Including external collaborators
      - Expedited support (includes system administration, accounts, application support, and software installation)
  - No indirect costs when added to grants since this is an equipment purchase
Amarel Condominium Model

• Subsidizing helps keep costs down so researchers can afford more compute power
  – OARC would cover costs of racks, cabling, network interconnect, system administration, maintenance, and spare nodes

• Storage (attached to computing)
  – Limited amount available with back-up to everyone for free (home directories)
  – Available for purchase – would like to keep costs to ~$150/TB or less; good for four years
  – Backed up/snapshot (home directories and purchased) and non-backed up (scratch)

• Hadoop/Spark (Data analytics environment)
• Dedicated allocation requests will be available through a review process
Future Plans: One-Rutgers Elastic Condo Environment Will Allow Us to Leap Frog

Distributed condo model designed so everything feels local and accessible through a single login node. Includes Science DMZ and Software Defined Networking.
One-Rutgers Cloud Infrastructure

- Requires ACI to be in place – fast/low-latency networks, Science DMZs, SDN, perfSONAR, Advanced Computing, Storage
- Resources will be distributed across New Brunswick/Piscataway, Newark, and Camden
- The uniqueness of the design can and will be leveraged for future grants
- Designed to serve multiple research and experimental needs
- Elastic in the sense that we can grow and shrink into cloud resources based on demand and job type (OSG, Amazon, Azure)
- Couples NSF funded national projects and commercial cloud services directly into our environment creating a one-stop shop for the researcher
- Positions us to be a national (and international) player