

Advanced Cyberinfrastructure Research & Education Facilitators: Overview

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ACI-REF Virtual Residency 2015
Sunday May 31 2015**





Let's Introduce Ourselves!

- Let's go around the room.
- Say your name, your institution, your role, and why you wanted to attend the ACI-REF Virtual Residency.
 - What do you hope to get out of this week?





Outline

- This is an experiment!
- Advanced Cyberinfrastructure Research & Education Facilitators
- National Science Foundation's Campus Cyberinfrastructure Programs
- You're Next ...





This is an Experiment!

- Everything about this week is exciting and new.
- You are the first cohort of what we want to be a national program.
- This means that you are helping us to pioneer a new way of developing the next generation workforce.





You Voted with Your Feet

- We thought most of the interest would be in learning how to be a Campus CI Engineer.
- But it turned out that a big chunk of the national need is learning how to help researchers do the computing- and data-intensive parts of their research.
- Since we do both here, we can teach both here.
 - So we can serve both sides of the national need.





Only You ...

- ... can make this Virtual Residency a success.
 - Ask questions -- the only dumb question is the one you don't ask.
 - Volunteer your ideas and experiences.
 - Ultimately, it's you who will have to be in charge, not us.





Advanced Cyberinfrastructure Research & Education Facilitators





What is an ACI-REF?

- Advanced Cyberinfrastructure Research & Education Facilitator (term invented by Miron Livny)
- Work with users -- researchers and educators -- to help them improve their research and/or education productivity using advanced cyberinfrastructure.
- Typically, one or a few ACI-REFs have responsibility for an entire institution, or multiple institutions.
- Some ACI-REFs are:
 - faculty or former faculty;
 - postdocs or former postdocs;
 - research staff or former research staff;
 - IT professionals;
 - graduate or undergraduate students.





A Little Background

- In 2013, a team of 13 institutions led by Clemson U submitted an 8-figure proposal on this issue, to provide multiple ACI-REFs at each institution over a 4 year period.



- The proposal also included funding for advanced networking.





OU's Piece

- OU's piece included some extra components:
 - a component about EPSCoR jurisdictions, shared with HI, SC, UT;
 - a Virtual Residency to teach how to be an ACI-REF.





Ah, if only

- Unfortunately, the NSF wasn't able to fully fund that proposal. The team ended up reducing down to 6 institutions for 2 years, and no advanced networking.
- “Phase 1:”
 - Clemson U
 - Harvard U
 - U Hawai'i
 - U Southern California
 - U Utah
 - U Wisconsin
- “Phase 2:”
 - Arizona State U
 - Emory U
 - Ohio Supercomputer Center
 - Stanford U
 - Sunshine State Education & Research Computing Alliance (SSERCA)
 - **U Oklahoma**
 - U Washington





National Science Foundation's Campus Cyberinfrastructure Programs





And then ...

- In 2012-13, the NSF had a program called “Campus Cyberinfrastructure - Networking Infrastructure & Engineering” (CC-NIE).
 - Two subprograms: One for deploying networking equipment, one for innovative networking research.
 - OU, OSU, Oklahoma Innovation Institute, Langston U, OneNet: “OneOklahoma Friction Free Network”
- In 2014, that was followed by “Campus Cyberinfrastructure - Infrastructure, Innovation & Engineering” (CC*IIE).
 - Several new subprograms, including “Campus CI Engineer.”





So ...

- OU submitted a proposal to the Campus CI Engineer subprogram:
 - “A Model for Advanced Cyberinfrastructure Research and Education Facilitators”
 - \$400K
 - Highlights the relationship between OU and the ACI-REF project.
- OU is the only institution that is all of:
 - ACI-REF Phase 2 (so already engaged)
 - EPSCoR (and was to have co-lead the ACI-REF EPSCoR thrust)
 - CC-NIE awardee (so need a Campus CI Engineer already)





Objectives

- Data-Intensive Research Facilitation: Via Software Defined Networking (SDN) across OFFN, facilitate end-to-end management, by researchers, of high bandwidth/high performance data flows through a distributed hierarchy of open standards tools, providing researchers with a new layer of transparency into network transport at OU, among OneOCII institutions, and with ACI-REF members.
- Oklahoma ACI-REF project: Lead and facilitate adoption of the ACI-REF approach across Oklahoma, leveraging extant and emerging capabilities within OneOCII.
- **National training regime: Provide a “virtual residency” program for Campus CI Engineers and other ACI-REFs, open to not only CC*IIE awardees and ACI-REF members but any institution that needs.**
- Research Experiences for Undergraduates (REU) Sites/Supplements: Foster undergraduate research at OU via a culture of integrating REU sites and supplements into Science, Technology, Engineering & Mathematics (STEM) research, including by all research themes on this proposed CC*IIE project.





Success!

- Reviewer comments
 - “This energetic, detailed and ambitious proposal from the University of Oklahoma deserves the highest priority for support. ... There are no major weaknesses in the proposal and many strengths. ...”
 - “The broader impacts are nicely defined in terms of ... the idea of a residency program A residency program and enhancement of undergraduate research are strong enhancements to the proposal. ...”
 - “This is one of the better proposals regarding ... additional outreach via the budgeted virtual residency program. ...”





Virtual Residency





Lots of Interest

- For the proposal, we had 33 institutions in 23 states and territories that expressed interest in the residency workshops, including 3 Minority Serving Institutions, 19 institutions in 13 EPSCoR states and 7 non-PhD-granting institutions.
- We had applications from over 65 people at 50 institutions in 31 states and territories.
- The final headcount is 52 (29 onsite, 23 remote) from 40 institutions in 26 states and territories, including 19 institutions in 12 EPSCoR states, 5 Minority Serving Institutions and 5 non-PhD-granting institutions.





Agenda

- You've got a copy of the agenda in front of you.
- Everything on it is subject to change without notice:
 - We may drop some of the sessions.
 - We may add sessions that we think are needed.
- You're going to help us learn how to help you learn.





What Are We Here to Accomplish?

- Learn how to work with researchers who are using CI.
 - Learn how to talk to them.
 - Learn how to help them.
- Learn how to contribute to, and ultimately to lead, grant proposals.
 - Some of you already know how to do this, so you'll help us help the rest to learn.
- Science DMZ Track
 - Learn how to manage a Science DMZ.
- Computational Science & Engineering Track
 - Get some practice working with researchers.





What Aren't We Trying to Do?

- On the Computational & Data-enabled Science & Engineering track, we **AREN'T** trying to teach you a lot of technical content.
 - You can learn that from other sources.
- Instead, our goal is to teach you the **PROFESSION** of ACI-REF.





What Are We Really Here For?

- We're really here to prepare for an upcoming transition to:
 - more need for this kind of skilled workforce, but
 - fewer people who know how to do it, with
 - no mechanism to prepare a sufficiently large cohort.
- Some of us here already know how to do this.
 - But it took a very long time to learn on our own.
 - To keep up with demand, the community needs us to streamline the process so that new ACI-REFs can become fully productive quickly.
- You're the leaders of tomorrow.





You're Next ...



<http://freapp.us/apps/android/com.im.uncle.sam/>





A Growing Need, a Growing Breed

- The Coalition for Academic Scientific Computation (CASC) is a group of most of the mid-to-large academic and government CI centers in the US.
- When OU joined CASC in 2004, there were roughly 35 member institutions.
- Now there are 82.
- So the growth has been significant.
- There are a total of about 300 institutions on the US News rankings of STEM graduate programs.
- So the growth potential is substantial.





Get Ready to Be in Charge

- Baby Boomers: born 1946-1964 (ages 50-69)
- Generation X: 1965-1984 (ages 31-50)
- Millennials: roughly ages 10-30

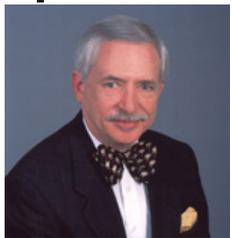
“Roughly 10,000 Baby Boomers will turn 65 today, and about 10,000 more will cross that threshold every day for the next 19 years.” -- Pew Research Center, 2010 <http://www.pewresearch.org/daily-number/baby-boomers-retire/>

Who do you think is going to have to take up the mantle they're currently carrying?





OK Supercomputing Symposium 2015



2003 Keynote:
Peter Freeman
NSF
Computer & Information
Science & Engineering
Assistant Director



2004 Keynote:
Sangtae Kim
NSF Shared
Cyberinfrastructure
Division Director



2005 Keynote:
Walt Brooks
NASA Advanced
Supercomputing
Division Director



2006 Keynote:
Dan Atkins
Head of NSF's
Office of
Cyberinfrastructure



2007 Keynote:
Jay Boisseau
Director
Texas Advanced
Computing Center
U. Texas Austin



2008 Keynote:
José Muñoz
Deputy Office
Director/Senior
Scientific Advisor
NSF Office of
Cyberinfrastructure



2009 Keynote:
Douglass Post
Chief Scientist
US Dept of Defense
HPC Modernization
Program



2010 Keynote:
Horst Simon
Deputy Director
Lawrence Berkeley
National Laboratory



2011 Keynote:
Barry Schneider
Program Manager
National Science
Foundation



2012 Keynote:
Thom Dunning
Director
National Center for
Supercomputing
Applications



2013 Keynote:
John Shalf
Dept Head CS
Lawrence
Berkeley Lab
CTO, NERSC



2014 Keynote:
Irene Quarters
Division Director
Advanced
Cyberinfrastructure
Division, NSF



2015 Keynote:
Jim Kurose
NSF
Computer & Information
Science & Engineering
Assistant Director

FREE!

**Wed Sep 23 2015
@ OU**

**Reception/Poster Session
Tue Sep 22 2015 @ OU
Symposium
Wed Sep 23 2015 @ OU**



Write a CI Proposal
ACI-REF Virt Res 2015, Thu June 4 2015

Thanks for your
attention!



Questions?

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