Advanced Cyberinfrastructure Research & Education Facilitators Virtual Residency: Overview

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Advanced Cyberinfrastructure Research & Education Facilitators Virtual Residency Workshop 2017
Sunday July 30 2017

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  OR

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- On any USA phone, dial:
  - 646-558-8656 (USA toll)
  OR
  - 408-638-0968 (USA toll)
- Meeting ID: 189 365 705
- **<u>NOTE</u>**: **NO TOLL FREE** telephone audio-only option for remote attendees.
- Please **<u>MUTE YOURSELF</u>** except when you're talking.

Let's Introduce Ourselves!

- Let's go around the room.
- Tell us:
    - your name;
    - your institution;
    - your role at your institution;
    - why you wanted to attend the ACI-REF Virtual Residency workshop;
- 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 either time-tested (2015-17), or exciting and new, or both.

- Those of you who are new are only the third cohort of what we intend to be a national program.

- This means that you're helping us to pioneer a new way of developing the next generation Cyberinfrastructure (CI) workforce.

You Voted with Your Feet

- Originally, we thought most of the interest would be in learning how to be a Campus CI Engineer.

- But it turned out that by far the biggest national need is learning how to help researchers do the computing-intensive and data-intensive parts of their research.
  - 2015: Science DMZ Track: 14% (7 of 50)
  - 2016: Science DMZ Track: 21% (22 of 104)
  - 2017: Science DMZ Track **not offered**

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 coined by Miron Livny, U Wisconsin)
- Work with users -- researchers and educators -- to help them improve their research and/or education productivity and aspirations using advanced cyberinfrastructure.
- Typically, one or a few ACI-REFs have responsibility for an entire institution, or multiple institutions.
- At some institutions, CI facilitation is part time; at other institutions, it's a full time job. It can come from:
  - 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.

http://www.aciref.org/wp-content/uploads/2014/04/map.png

- 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 (note that UT has now graduated from EPSCoR);
    - EPSCoR: Established (formerly Experimental) Program for the Stimulation of Competitive Research: a federal program to promote and increase STEM research in states that get less than 0.75% of federal research funding.
      - NSF, Dept of Energy, Dept of Defense, NASA
      - NIH (known as INBRE)
  - a Virtual Residency to teach how to be an ACI-REF -- **THIS**!

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 …

- In 2014, 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.
- We put Clemson's Phase 1 PI on our External Advisory Committee.
- OU was the only institution that was all of:
    - ACI-REF Phase 2 (so already involved)
    - EPSCoR (and was to have co-lead the ACI-REF EPSCoR thrust)
    - CC-NIE awardee (so need a Campus CI Engineer already)

Objectives

- <u>Data-Intensive Research Facilitation</u>: 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.

- <u>Oklahoma ACI-REF project</u>: Lead and facilitate adoption of the ACI-REF approach across Oklahoma, leveraging extant and emerging capabilities within OneOCII.

- **<u>National training regime</u>: 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.**

- <u>Research Experiences for Undergraduates (REU) Sites/Supplements</u>: 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**. …"

[Emphasis added.]

Even More Success!

From a review from the Clemson-led Research Coordination Network grant that created the Campus Research Computing (CaRC) Consortium, regarding broader impacts:

- "The **ACI-REF virtual residency** held at OU Supercomputing Center may be … notable … (the web site's description of the workshop looked outstanding) -- assuming it was available to a broader community and not just the [Phase 1] awardees."
  - 2015: 49 of 50 participants (98%), from 37 of 38 institutions (97%), were "not just the [Phase 1] awardees."
  - 2016: 90 of 99 participants (91%), from 60 of 66 institutions (91%), were "not just the [Phase 1] awardees."
  - 2017: 228 of 241 preregistrants (95%), from 159 of 165 institutions (96%), were "not just the [Phase 1] awardees."

Virtual Residency

Lots of Interest 2014

- For OU's 2014 Campus CI Engineer proposal, we had 33 institutions in 23 US states and territories that expressed interest in the Virtual Residency workshops, including:
  - 19 institutions in 13 EPSCoR states;
  - 3 Minority Serving Institutions;
  - 7 non-PhD-granting institutions.

Lots of Interest 2015-16

- **<u>Participants</u>**
  - 2015: 50 total from 38 institutions in 26 states and territories (28 onsite and 22 offsite via videoconferencing), including:
    - 21 institutions in 12 EPSCoR jurisdictions;
    - 5 Minority Serving Institutions;
    - 5 non-PhD-granting institutions.
  - 2016: 98 total from 67 institutions in 33 states & territories plus 3 other countries (43 onsite and 55 offsite via videoconferencing), including:
    - 20 institutions in 13 EPSCoR jurisdictions;
    - 10 Minority Serving Institutions;
    - 13 non-PhD-granting institutions.

Lots of Interest 2017

2017: 241 preregistrations so far (52 onsite, 189 remote),
from 165 institutions in 51 US states & territories and
4 other countries, including:

- 56 institutions in 26 of 27 EPSCoR jurisdictions (missing USVI);

- 27 Minority Serving Institutions;

- 25 non-PhD-granting universities and colleges,
  3 community colleges, 3 secondary schools;

- 101 (46%) of 219 Campus Champion institutions;

- 55 (68%) of 81 member institutions of the
  Coalition for Academic Scientific Computation;

- all 28 of the Campus Research Computing (CaRC) institutions.

DISCLAIMER: Not everyone who preregisters will attend ….

Lots of Interest (cont'd)

Total 2015-17: 205 institutions in **EVERY STATE IN THE US**, 3 US territories (DC, PR, GU) and 8 other countries, including:

- 66 institutions in 26 EPSCoR jurisdictions (no USVI);
- 34 Minority Serving Institutions;
- 34 non-PhD-granting colleges and universities, 3 community colleges, 3 secondary schools;
- 125 (57%) of 219 of Campus Champion institutions;
- 61 (75%) of 81 of Coalition for Academic Scientific Computation institutions;
- all 28 of the Campus Research Computing (CaRC) institutions.

DISCLAIMER: That's if everyone who's registered so far actually participates, which of course won't actually happen.

Agenda

- You can get a copy of the agenda in your web browser:

http://www.oscer.ou.edu/acirefvirtres2017.php#agenda

- 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.
    - Not everyone here will do this for a living, but it'll help you to understand it regardless, because your customers do it.
- Get some practice working with researchers.

What Aren't, and Are, We Trying to Do?

- We **<u>AREN'T</u>** trying to teach you a lot of technical content.
  - You can learn that from other sources.
- We **<u>ARE</u>** trying to teach you the **PROFESSION** of CI facilitation.

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 CI facilitators 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 81.

- So the growth has been significant.

- But, there are a total of 329 institutions that have a Carnegie classification of "doctoral."

- So the growth potential is substantial.

Get Ready to Be in Charge

- Baby Boomers: born 1946-1964 (ages 53-72)

- Generation X: 1965-1984 (ages 33-52)

- Millenials: roughly ages 13-33

"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?

Why ACI-REF is the Best Job Ever

Every day, you get to see how the work you do helps other people to be successful.

Acknowledgements

Thanks to our sponsors!

Without our sponsors, we couldn't run this year's event.

- Gold Sponsors
    - Hewlett Packard Enterprise
    - Intel
- Silver Sponsors
    - Amazon Web Services
    - DataDirect Networks
    - Fierce Software
    - Nimble Storage HPE
    - Symbolic IO

T-shirts Coming!

100% Cotton!

Arriving this week!

Remote attendees: We'll get them to you, but only if you show up as having joined us on Zoom!

Thanks for your attention!

Questions?

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