Virtual Residency Intermediate Workshop: Overview

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Virtual Residency Intermediate Workshop 2018, Sunday August 5 2018

Workshop Webpage & E-mail

■ Workshop webpage:

http://www.oscer.ou.edu/acirefvirtres2018/

All materials will be posted here, including slides (if any) and links to streaming video of the sessions.

■ Workshop e-mail address:

virtualresidency2018@gmail.com

If you have questions, sending them to this e-mail address means that they'll get auto-forwarded to Henry and Debi.

Zoom Videoconferencing

- Zoom is compatible with Windows, MacOS, Linux, iOS and Android.

- If you can't do that, you can use your phone for audio-only (but video+audio is better).

- Slides will be posted on the workshop webpage, but we can't guarantee that they'll always be posted before they're used.

- We hope to be able to post streaming video of all sessions after each session, but we don't know how long the lag will be (probably hours, hopefully by the next day).

- Please **MUTE YOURSELF** except when you're talking.

http://www.oscer.ou.edu/acirefvirtres2018/ virtualresidency2018@gmail.com

Zoom: Video+Audio

- **Windows**, **MacOS** or **Linux**:
  - Open a web browser and go to:
    - https://zoom.us/j/848605929
  - That will get you a download of the Zoom app for your OS.
- **Android** or **iOS**:
  - Go to your app store and download the FREE Zoom app.
  - Run the Zoom app and go to meeting ID number 848605929.
- In either case, follow the instructions, and please use either
  - (a) your full name (first/given name and last/family name)
  OR
  - (b) your first/given name and your institution.
- Please **MUTE YOURSELF** except when you're talking.

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Phone: Audio Only, USA

For audio only via phone from inside the USA:

- On any USA phone, dial:
  - 646-558-8656 (USA toll)

  OR

  - 408-638-0968 (USA toll)
- Use meeting ID 848605929.
- Please e-mail hneeman@ou.edu with your name, institution and phone number, so that we can properly track and report how many people attended from each institution.
- **NOTE**: **NO TOLL FREE** telephone audio-only option for remote attendees inside or outside the USA.
- Please **MUTE YOURSELF** except when you're talking.

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Phone: Audio Only, Non-USA

For audio only via phone from outside the USA:

- Open a web browser and go to:

https://zoom.us/zoomconference?m=XitOumYvF5nOhatlfEVdGt9bQdiBq3Rk

- Find your country and call that TOLL number (NO toll free).
- Use meeting ID 848605929.
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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 Virtual Residency workshop.
- What do you hope to get out of this week?
- We probably don't have enough time for everyone on videoconferencing to do the same, but we'll try to give people an opportunity to introduce themselves if they want.

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Outline

- This is an experiment!

- Research Computing Facilitators

- National Science Foundation's Campus Cyberinfrastructure Programs

- You're Next …

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This is an Experiment!

- Almost everything about this week is exciting and new.
- Those of you who are new are only the 4th cohort of what has become a national program.
- This means that you're helping us to pioneer a new way of developing the next generation Cyberinfrastructure (CI) workforce.

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Only You …

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

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This Is So New, We Don't Know How to Teach It

- For the Introductory workshops, we were able to find speakers for most of the topics we covered.

- For this workshop, almost none of the topics are issues that any of us know enough about to be able to teach it to others.

- So, most of the sessions are panels and roundtables – we'll learn from each other!

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Research Computing Facilitators

What is a Research Computing Facilitator?

- "Advanced Cyberinfrastructure Research & Education Facilitator" (ACI-REF – term coined by Miron Livny)
- Work with users – researchers and educators – to help them improve their research and/or education productivity and aspirations via advanced cyberinfrastructure.
- Typically, one or a few Facilitators have responsibility for an entire institution, or multiple institutions.
- At some institutions, CI facilitation is part time; at others, it's full time. Some Research Computing Facilitators 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.

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 Virtual Residency to teach how to be a Research Computing Facilitator – **THIS**!

- 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)

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 Madison

- "Phase 2:"
  - Arizona State U
  - Emory U
  - Ohio Supercomputer Center
  - Stanford U
  - Sunshine State Education & Research Computing Alliance (SSERCA)
  - **U Oklahoma**
  - U Washington

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 Campus CI Engineer proposal:
  - "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: 186 of 196 participants (95%), from 128 of 134 institutions (96%), were "not just the [Phase 1] awardees."

Virtual Residency

Virtual Residency: What?

- We teach pre-service and in-service
  Research Computing Facilitators
  how to do (or do better)
  Research Computing Facilitation.

- But then we have a hidden secret agenda ….

Virtual Residency: How?

- Annual weeklong summer workshop (2015, 2016, 2017, 2018)
  - U California System has run its own targeted workshop based on our introductory workshop, in April 2017 and April 2018.
- Biweekly conference calls
- Annual meeting at the SC supercomputing conference
- 2017-18: Grant Proposal Writing Apprenticeship
  (will be repeated, because the grant proposal didn't get funded)

Before the Virtual Residency,
no one had ever been dumb enough to try to teach this stuff.

Virtual Residency: Why?

- CI Facilitators have strong experience within their discipline (often non-CS).

- Most CI Facilitators and CI Engineers haven't been faculty.

- Sometimes little or no research experience (especially for IT staff who have an enterprise IT background).

- Even if strong research background, typically little or no experience with research outside their own discipline.

- When we started the Virtual Residency in 2015, there were no local, regional or national programs to teach people how to be a Research Computing Facilitator.

- In the olden days, you could take your time learning how to do this – but not anymore ….

Virtual Residency: Who?

2015-present: **If** everyone who registered for the Aug 2018 workshop participates, we'll have served ~575 people from 265 institutions in all 50 US states and 3 US territories, plus 7 other countries, including:

- 39 institutions (15%) Minority Serving Institutions;
- 55 institutions (21%) non-PhD-granting institutions;
- 41 institutions (28%) in 24 of 25 (96%) EPSCoR jurisdictions;
- 172 institutions (65%) Campus Champion institutions (66% of Campus Champion institutions).

This is for **ALL** Virtual Residency activities, including:

- workshops (including mini-workshops by/for U California);
- conference calls;
- the Grant Proposal Writing Apprenticeship.

Why is Helping Researchers Hard?

- **<u>Ubiquity</u>**: Within any discipline, a greater proportion of researchers do computing-intensive and/or data-intensive research.

- **<u>Applicability</u>**: More disciplines do computing-intensive and/or data-intensive research.

- **<u>System Complexity</u>**: The storage hierarchy is getting deeper (flash, non-volatile RAM etc), and parallelism is getting more hybrid (GPUs etc).

- **<u>Conceptual Distance</u>**: The mental gap from handheld computing to command line/Linux/batch/remote/shared.

But we still only have one hour before they lose interest!

More Institutions Have On-Premise CI

The fraction of national universities that have on-premise research computing resources (US News rankings):

- 49 of the top 50 institutions;
- 96 of the top 100;
- 136 of the top 150 (91%);
- 167 of the top 200 (84%).

More Institutions Have Virtual Residents

The fraction of national universities that have participated in, or are registered to participate in, the Virtual Residency (US News rankings):

- 7 of the top 10 institutions (70%);
- 18 of the top 25 (72%);
- 36 of the top 50 (72%);
- 54 of the top 75 (72%);
- 73 of the top 100 (73%);
- 106 of the top 150 (71%);
- 126 of the top 200 (63%);
- 162 of the top 300 (54%).

The CI Professional Ecosystem

- Clemson-led ACI-REF project
- Coalition for Academic Scientific Computation
- Campus Research Computing Consortium (CaRCC)
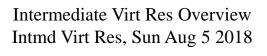- **Campus Champions**
- CyberAmbassadors
- Linux Clusters Institute
- SIGHPC Education Chapter
- Software & Data Carpentry
- Science Gateways Community Institute
- UK Research Software Engineer Association
- Working Toward Sustainable Software for Science Practice and Experience
- US Research Software Sustainability Institute

JOIN THESE!
Ask us for contact info!

What Aren't We Trying to Do?

- We **AREN'T** trying to cover a lot of ~~technical content~~.
    - People can learn that from other sources.
- Instead, the goal is to teach the **PROFESSION** of CI facilitation.

What's Our Hidden Agenda?

- The real goal is 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 the participants already knew how to do this.
  - But it took a very long time to learn on their own.
  - To keep up with demand, the community needs us to streamline the process so that new facilitators can become fully productive quickly.
- These are the CI leaders of tomorrow.

2018 Intermediate Workshop Agenda

Sun Aug 5 2018

- Pizza party!
- Workshop Overview
- Recap of Intro workshops
- How to Give a CI Tour, and Why [back by popular demand]

Mon Aug 6 2018

- Strategic Thinking & Visioning
- The CI Ecosystem & the Four Facings
- Explaining Complex Technical Topics to Researchers
- Sustainability

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2018 Intermediate Workshop Agenda

Tue Aug 7 2018

- Teams of CI Professionals: Recruitment & Retention, Management, Team-building and Motivation
- The CI Funding Landscape
- Cloud vs On-Premise: Explaining Pros & Cons
- Identifying Target Populations and Broadening the Constituency

Wed Aug 8 2018

- Assessing and Anticipating Researcher Needs
- Internal Budget Justification
- Working Effectively with Vendors
- Deciding Which Technologies to Adopt, and When
- National Weather Center Tour [You **MUST** have prebooked.]

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2018 Intermediate Workshop Agenda

Thu Aug 9 2018

- Low Cost Solutions for Research Computing Hardware and Maximizing Value from Acquisitions

- Research Computing Facilitation for Non-traditional Disciplines

- Mapping Research Requirements to Software Tools

- Research Computing and Data Professionals Job Elements and Career Guide

Fri Aug 10 2018

- User Experience, Visualization and Usability

- Contributing to the National CI Community

- Emerging Technologies

- Stories from the Trenches

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Agenda

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

http://www.oscer.ou.edu/acirefvirtres2018.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 find them.
    - Learn how to help them.
- Learn how to be, or prepare to be, institutional CI leaders.
    - 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 chain of command does it.

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 and CI leadership.

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, and new CI leaders, can become fully productive quickly.
- You're the CI 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 ~85.

- 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 This is the Best Job Ever

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

Acknowledgements

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  - Grant No. 1440783, "A Model for Advanced Cyberinfrastructure Research and Education Facilitators"
  - Grant No. 1546711, "EAGER: Fact-Gathering and Planning for a National-Scale Cyberpractitioner Program," Internet2, $41K
  - Grant No. 1620695, "RCN: Advancing Research and Education Through a National Network of Campus Research Computing, Infrastructures – The CaRC Consortium, " Clemson U, $748K
  - Grant No. 1548562, "XSEDE 2.0: Integrating, Enabling and Enhancing National Cyberinfrastructure with Expanding Community Involvement," U Illinois Urbana-Champaign, $110M

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Intermediate Virt Res Overview
Intmd Virt Res, Sun Aug 5 2018

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Thanks for your attention!

Questions?

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