

NCSA Faculty Fellows 2020 Idea Acceleration Workshop

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NCSA Fellow Program

- An opportunity for faculty and researchers at the UIUC to catalyze and develop long-term research collaborations between Illinois departments, research units, and the NCSA.
- Competitive program provides seed funding for demonstration, start-up projects, workshops, and/or other activities with the potential to lead to longer-term collaborations around research, development & education.
- **Feb. 7, 2020: NCSA Fellowships Ideas Accelerator Workshop.**
 - **10 am-12 pm, NCSA Lobby. Speed match-making event between potential applicants and NCSA staff and researchers.**
 - **Now accepting proposals through NCSA Faculty Fellows website**
- **Feb. 28, 2019:** Deadline to submit to the NCSA Fellowships Program
- **Late April 2019:** Target date for decisions

Staff Slides

Faculty Fellows Idea Acceleration Workshop

February 7, 2020

- User Services SEAS Group
 - Science and Engineering Application Support on Blue Waters
 - Provide support to the 30+ Illinois projects currently on Blue Waters
 - Support ranges from porting, debugging, performance analysis, scaling studies, code improvements, workflow implementation.
 - Assist with implementation of programming models: MPI, OpenMP and OpenACC.
- Galen Arnold
 - Performance Tuning, Debugging, HPC Python
 - Robert Brunner
 - NAMD, VMD, HPC runtimes (Charm++)
 - Tom Cortese
 - Computational fluid dynamics.
 - Jing Li
 - Numerical algorithms and methods
 - Ryan Mokos
 - Application porting, debugging, network simulation
 - Craig Steffen
 - Accelerators, IO
 - Roland Haas
 - Numerical Relativity, HPC Python



Data Analysis and Visualization (DAV)

<http://vis.ncsa.illinois.edu>

Enabling scientific discovery through data-oriented research and development

Support:

- Software (VisIt, ParaView, IDL, ImageMagick, etc)
- Data preparation
- Best practices & training
- Research and Development:
 - Data analysis (statistics, machine learning, etc)
 - Vis & I/O for HPC
 - AR/VR, sensors
 - “Is this in my data? Can I show it?”
- Outreach: production-quality videos



Healthcare Innovation program office

Cyberinfrastructure	<i>Compute, Security, Networking, Data Movement, Storage</i>
Computational Genomics	<i>Assembly, Variant Calling, Performance, Benchmarking</i>
Visual Analytics Software/Frameworks	<i>OmiX, KnowEng, PixSure, Re-usable and explainable AI</i>
Dashboards/Reporting	<i>Heterogeneous data, Monitoring, Predictive modeling</i>
Data Driven Decision Support	<i>Evidence Visualization</i>
Mobile Patient Support & Monitoring	<i>Mobile Apps, Patient-Clinician Communication</i>
Augmented Reality / Virtual Reality	<i>Surgery prep, Student Training</i>
UX Design and Information Design	<i>Data-Centered, Requirements Development, Explain-ability</i>
Data Analysis	<i>Biomarker Discovery, Population, Multi-Omic, Data Centers</i>
Image Analysis	<i>Deep Learning, Image Annotation</i>
Operations Analysis*	<i>Biobank, ER Outcome</i>
Remote Sensors, Remote Monitoring*	<i>Real-time Analysis, Tele-medicine</i>

NCSA Software

- Research & Development
- Custom/novel, reusable software tools & frameworks
- Bridging and amplifying efforts across different projects

Software Program Office

- Kenton McHenry
- Jong Lee
- Shannon Bradley



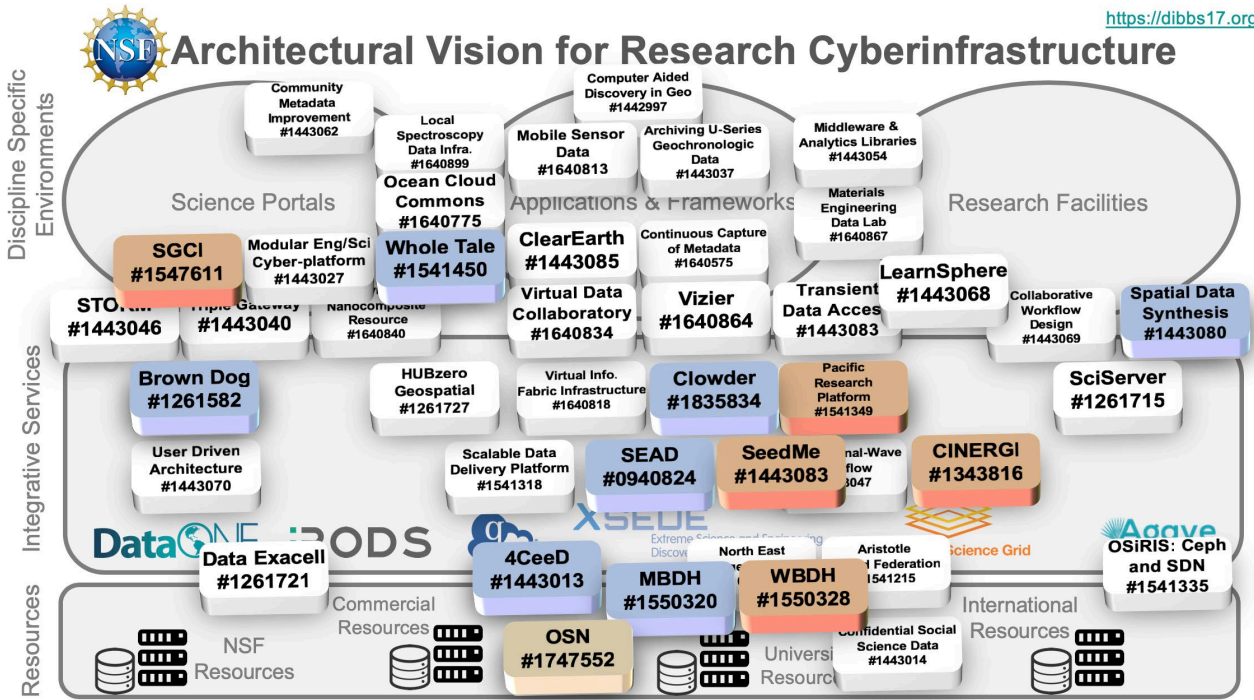



Management Committee



<p>Software Applications and Data Lab (SADL)</p> <ul style="list-style-type: none"> • Luigi Marini • Max Burnette • Chen Wang • Michelle Pitcel • Todd Nicholson • Wenjie Zhu 	<p>Research Software Applications and Learning Technologies (ReSALT)</p> <ul style="list-style-type: none"> • Chris Navarro • Sandeep Puthanveetil • Satheesan • Gowtham Naraharisetty • Diego Calderon Rivera • Michal Ondrejcek • Kaveh Karimi Asli 	<p>Middleware Technology Group (MTG)</p> <ul style="list-style-type: none"> • Steve Pietrowicz • Craig Willis • Bing Zhang • Htut Khine Win • Mikolaj Kowalik 	<p>Software Design Delivery and Deploy (SD3)</p> <ul style="list-style-type: none"> • Rob Kooper • Ben Galewsky • Yong Wook Kim • Mike Lambert • Mark Fredricksen • Mike Bobak 	<p>Visual Analytics (VA)</p> <ul style="list-style-type: none"> • Colleen Bushell • Matt Berry • Lisa Gatzke • Xiaxia Lao • Charles Blatti • Peter Groves
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<https://dibbs17.org>



A collection of logos for various software tools and organizations:

- CILogon:** Green logo with a circular arrow.
- Parsl:** Blue and white logo with a grid pattern.
- ERGO:** Orange and white logo with a globe.
- Knoweng:** Blue and green logo with a leaf.
- 4CEED:** Black logo with an atom symbol.
- yt:** Black logo with white text.
- Other logos:** A green leaf, a blue and green circular logo, a cartoon scientist, an orange cat, and a brown cat.

NATIONAL CENTER FOR SUPERCOMPUTING APPLICATIONS

Industrial Application Domain Teams

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ILLINOIS

NCSA | National Center for
Supercomputing Applications

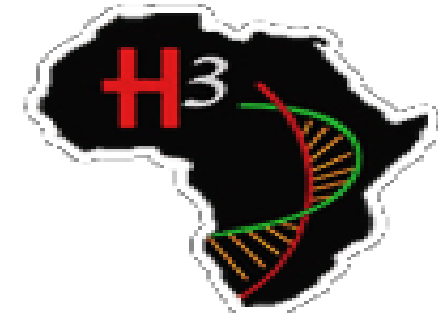
Industrial Application Domain Teams at NCSA

Technical Support and Consulting for NCSA Industry -the Largest Industrial HPC Outreach in the World

- Modeling & Simulation
- Bioinformatics and Genomics
- “Big” Data Analytics, GIS and Confluences with Artificial Intelligence (AI)
- Code Benchmarking, Profiling & Optimization
- Rapid User Support and Domain/HPC Training

Research and Education Support and Collaborations

- Staff made of mostly PhD-s, MSc-s and Students
- >30 Active research collaborators worldwide
- Publish ~30 joint publications / year
- Joint interdisciplinary proposals to NSF and NIH
- Speak 8 world and over 20 programming languages
- Work with >100 of applications (commercial, community, open source)



Midwest Big Data Hub

Priority Areas

- Advanced Materials and Manufacturing
- Smart and Resilient Communities
- Digital Agriculture
- Health and Biomedicine
- Water Quality

Cross-Cutting Themes

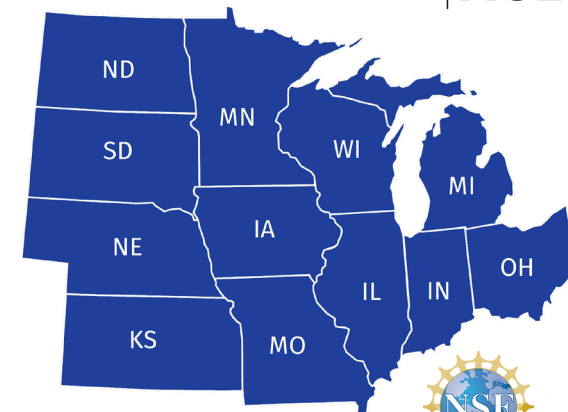
- Data Science Education and Workforce Development
- Cyberinfrastructure, Data Access, and Use

Goals

- Build and cultivate **Communities** around Data
- Foster innovative activities across our **Priority Areas**
- Increase **Education and Training** around Data
- Develop a **National Coordination** effort with the other 3 BD Hubs
- Establish organizational **Sustainability**

Join Us!

- All-Hubs Summit, May 26-28 @ OSU
- Working groups:
 - Materials & Manufacturing
 - Cybersecurity
 - Trusted CI WG on research data integrity
 - All-Hubs cyberinfrastructure WB webinars
- Student DS groups webinar series



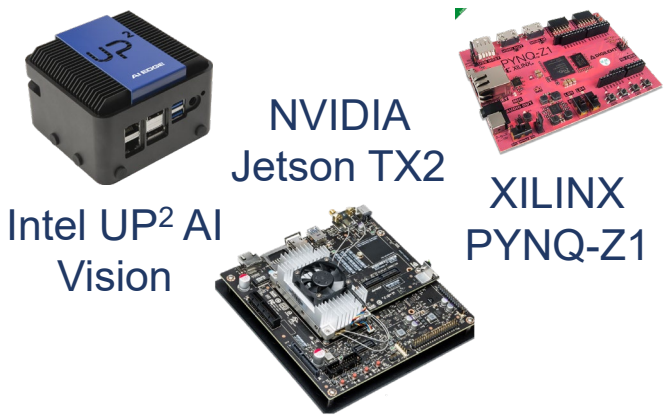
ISL R&D in AI Systems and Applications

AI Infrastructure



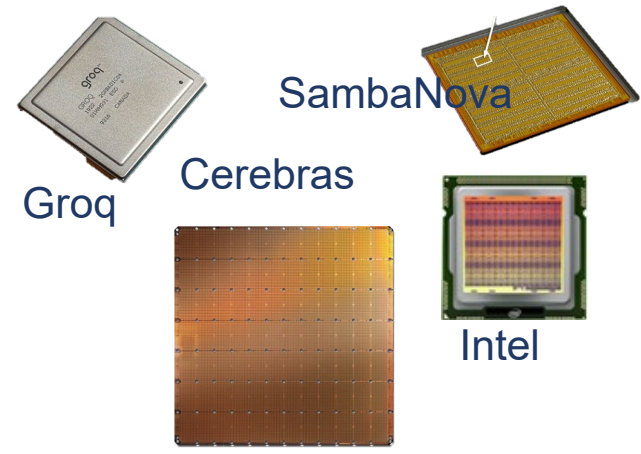
nano x86
IBM Power9

Edge Computing for AI



Intel UP² AI Vision
NVIDIA Jetson TX2
XILINX PYNQ-Z1

Emerging AI Architectures



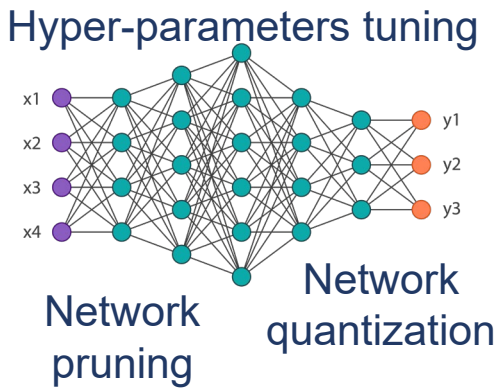
Groq
SambaNova
Cerebras
Intel

Reconfigurable Computing for AI

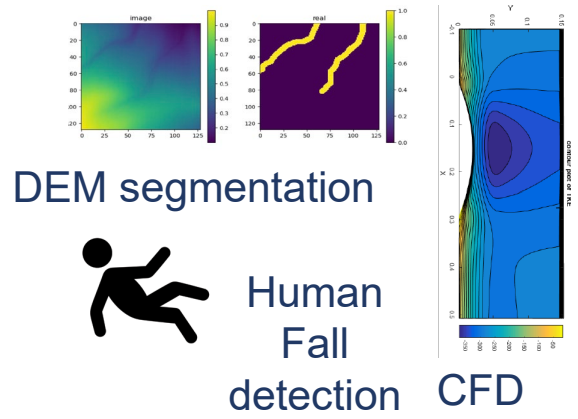


Nallatech 250S+
Xilinx KCU1500
Xilinx Alveo u250

Tools & Methods



ML Applications



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