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<https://xstackwiki.modelado.org/>

OS/R PI Meeting

May 23, 2016
Chicago, IL

Sonia R. Sachs

OS/R Program PI Meeting



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- **Thank you to the organizing committee:**
 - Pete Beckman
 - Ron Brightwell
 - Steven Hofmeyr
- **Thank you to ANL meeting support staff**
 - Lori O'Connor
- **Thank you to the ASCR meeting support staff**
 - Angela Thevenot



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OS/R Program Background



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- Challenges and strategies related to OS/R for Exascale platforms were identified in the ASCR Exascale Operating System and Runtime Software workshop October 4-5, 2012:

<https://collab.mcs.anl.gov/display/exaosr/Workshop%20Overview>

- ASCR/NNSA Technical Council on OS/R met March 2012 – October 2012. Technical Council meetings and OS/R workshop insights were captured in a report:

<http://science.energy.gov/~media/ascr/pdf/research/cs/Exascale%20Workshop/ExaOSR-Report-Final.pdf>

- Exascale challenges identified
- Lab solicitation in early January 2013
- Two full proposals were received in February 2013
- A third full proposal was invited and received a couple of months later



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OS/R Program



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- **Goal**
 - Create alternative platform-neutral OS/R prototypes and high impact/high risk technologies that eventually transition to vendor sustained OS/R offerings
- **Program Portfolio**
 - Two (2) three-year large collaborative projects that started in August, 2013
 - ARGO
 - HOBBS
 - One (1) three-year small collaborative project that started in September, 2013
 - X-ARCC



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OS/R Program Portfolio



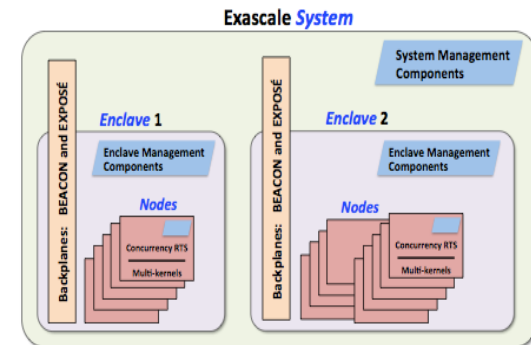
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ARGO



- Lead: Pete Beckman, ANL
- Institutions: PNNL, LLNL, UIUC, U. Chicago, U. Oregon, UTK, Boston U.

Node OS/R providing extremely lightweight multithreading, heterogeneous hardware resource management, and dynamic node management services. Complete node, enclave, and global OS/R prototype.

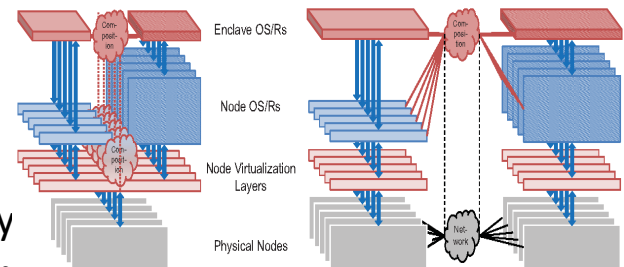


HOBBS



- Lead: Ron Brightwell, Sandia
- Institutions: LBNL, ORNL, LANL, U. Arizona, Georgia Tech, Indiana University, North Carolina State U., U. New Mexico, Northwestern U., U. Pittsburgh, UTK, U. Texas El Paso, UC Berkeley

Extensions of previous architectures and designs, providing complete node, enclave, and global OS/R prototype. Full system virtualization supports almost any RTS. Supports composition of applications developed for different programming systems.



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OS/R Program Portfolio



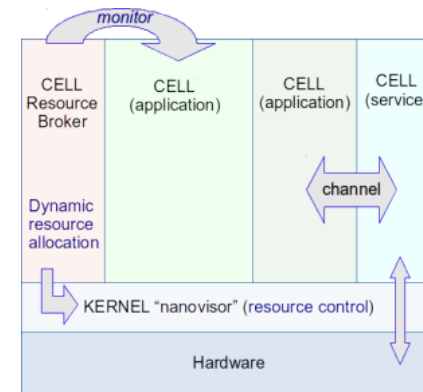
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X-ARCC

Lead: Steven Hofmeyr, LBNL
Co-lead: John Kubiotowicz, U. C. Berkeley

New approaches to Operating System design for exascale using *Adaptive Resource-Centric Computing (ARCC)*, which combines dynamic resource with Quality-of-Service (QoS). Based on the UCB Tesselation project.



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OS/R PI Meeting Goals and Agenda



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- **Goals:**
 - Research work review
 - Engagement with the vendor community
 - Discuss future OS/R research



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OS/R PI Meeting Agenda



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- 0800 - 0815** **Welcome and Meeting Goals** (Sonia, Bill)
- 0815 - 0845** **ARGO: Overview of Argo and OS/R Issues** (Pete Beckman / Kamil Iskra)
- 0845 - 0915** **ARGO: Argobots and lightweight threading** (Pavan Balaji / Sanjay Kale)
- 0915 - 0945** **ARGO: Global OS/R and Power** (Martin Schulz / Swann Perarnau)
- 0945 - 1000** *Break*
- 1000 - 1030** **HOBBS: Hobbes Overview and Update** (Ron Brightwell)
- 1030 - 1100** **HOBBS: Reimagining the Parallel OS/R Stack with Hybrid Runtimes**
(Peter Dinda)
- 1100 - 1130** **HOBBS: Mini-Chkpts: Surviving OS Failures in Persistent Memory**
(Frank Mueller)
- 1130 - 1245** *Lunch (walk to restaurant Labriola)*
- 1245 - 1330** **Post Moore's Law Research**
***"Custom Hardware Accelerators for Statistical Inference in
Machine Learning"***
Rob Rutenbar, UIUC Computer Science Chair.



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- 1330 - 1400** **X-ARCC: Overview and Results** (Steven Hofmeyr)
- 1400 - 1445** **Panel Discussion: Technology transition opportunities, lessons learned, and current gaps**
Panelists: Larry Kaplan, Cray
Eric Van Hensbergen, ARM
Mike Schulte, AMD
Bob Wisniewski, Intel
Yoonho Park, IBM
Moderators: Pete Beckman and Ron Brightwell
- 1445 - 1545** **Open discussion: Future research and gaps for exascale and beyond**
1. How OS/R will adapt as Moore's Law ends:
Moderator: Pete Beckman
2. U-Stack - a software architecture for enabling and supporting research
Moderator: Ron Brightwell
3. Ensuring application and OS/R integration in future research
Moderator: Steven Hofmeyr
- 1545 - 1600** Break
- 1600 - 1700** **Plenary demos from ARGO and HOBBS (30 min each)**
- MOVE TO ROOM NEXT DOOR**
- 1700 - 1830** **Technology Marketplace (stations with posters, demos, flyers, hands-on technology...)**