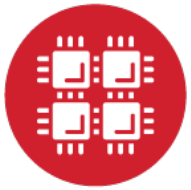


Ohio Supercomputer Center

An OH·TECH Consortium Member

Organizational Update: December 2015

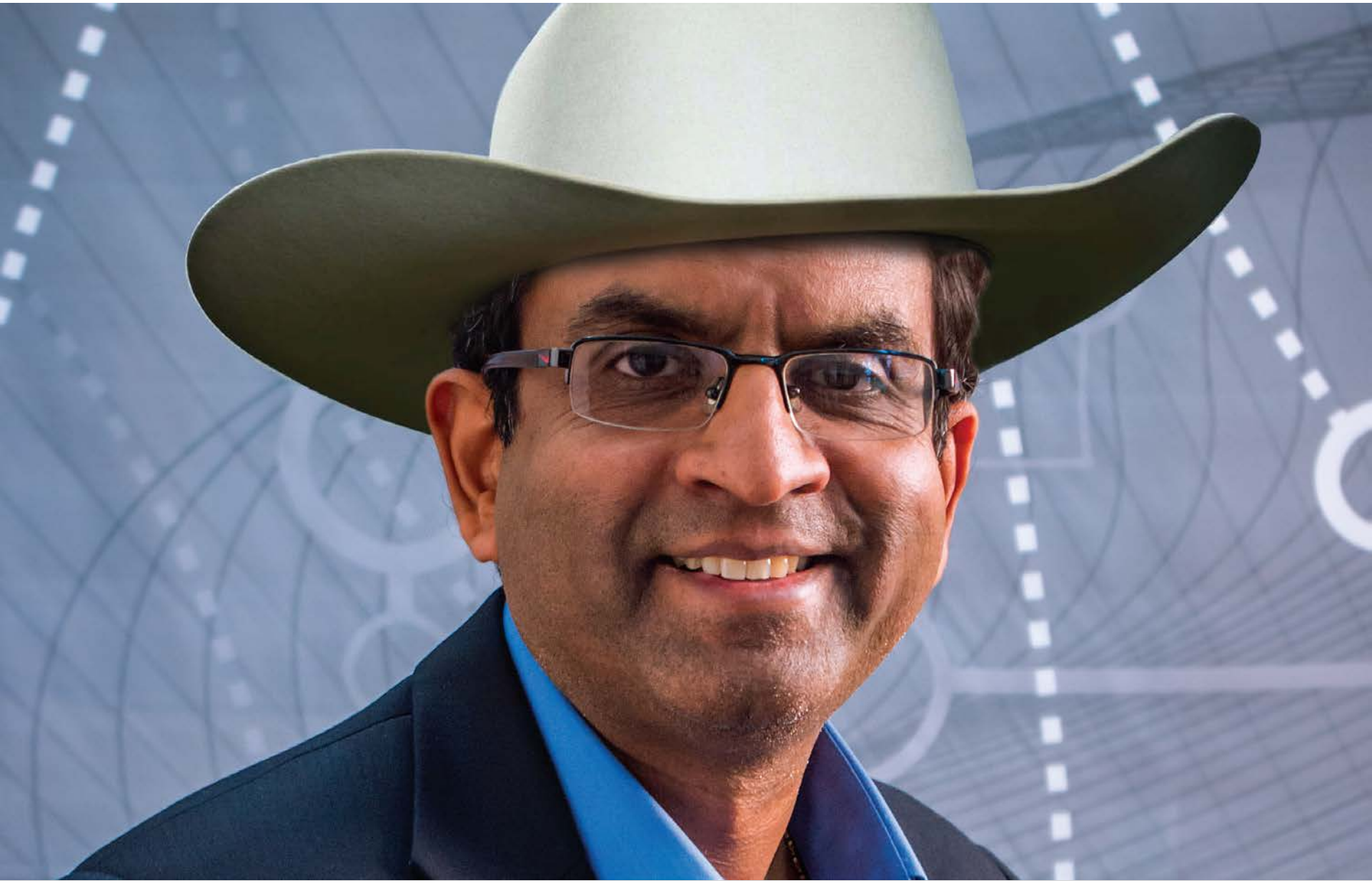
David Hudak

Doug Johnson

Alan Chalker

OSC Organizational Update

- Leadership changes
- State of OSC
- Roadmap
- Web app demonstration (if time)



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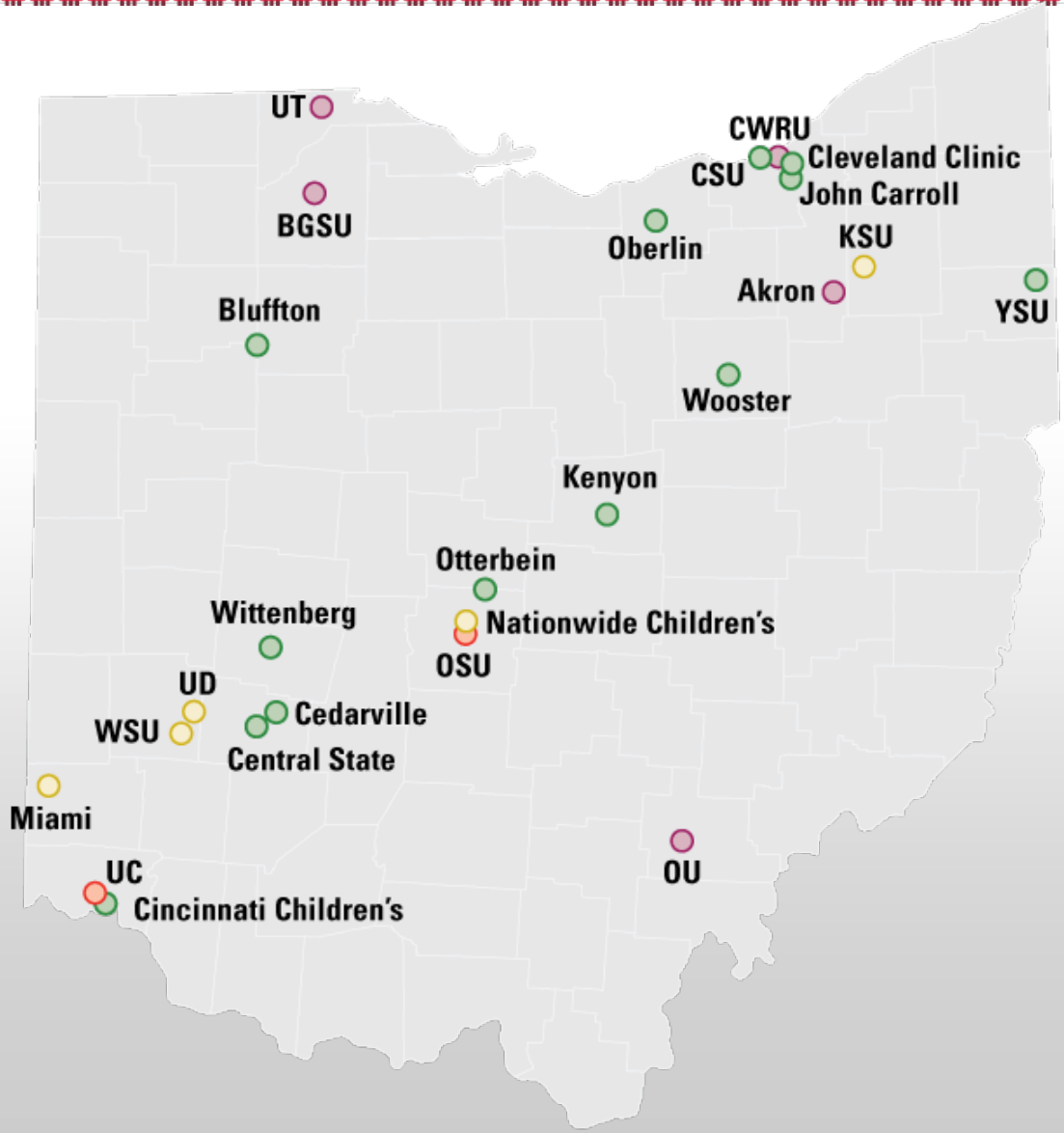
State of OSC

Organizational Impact CY2014

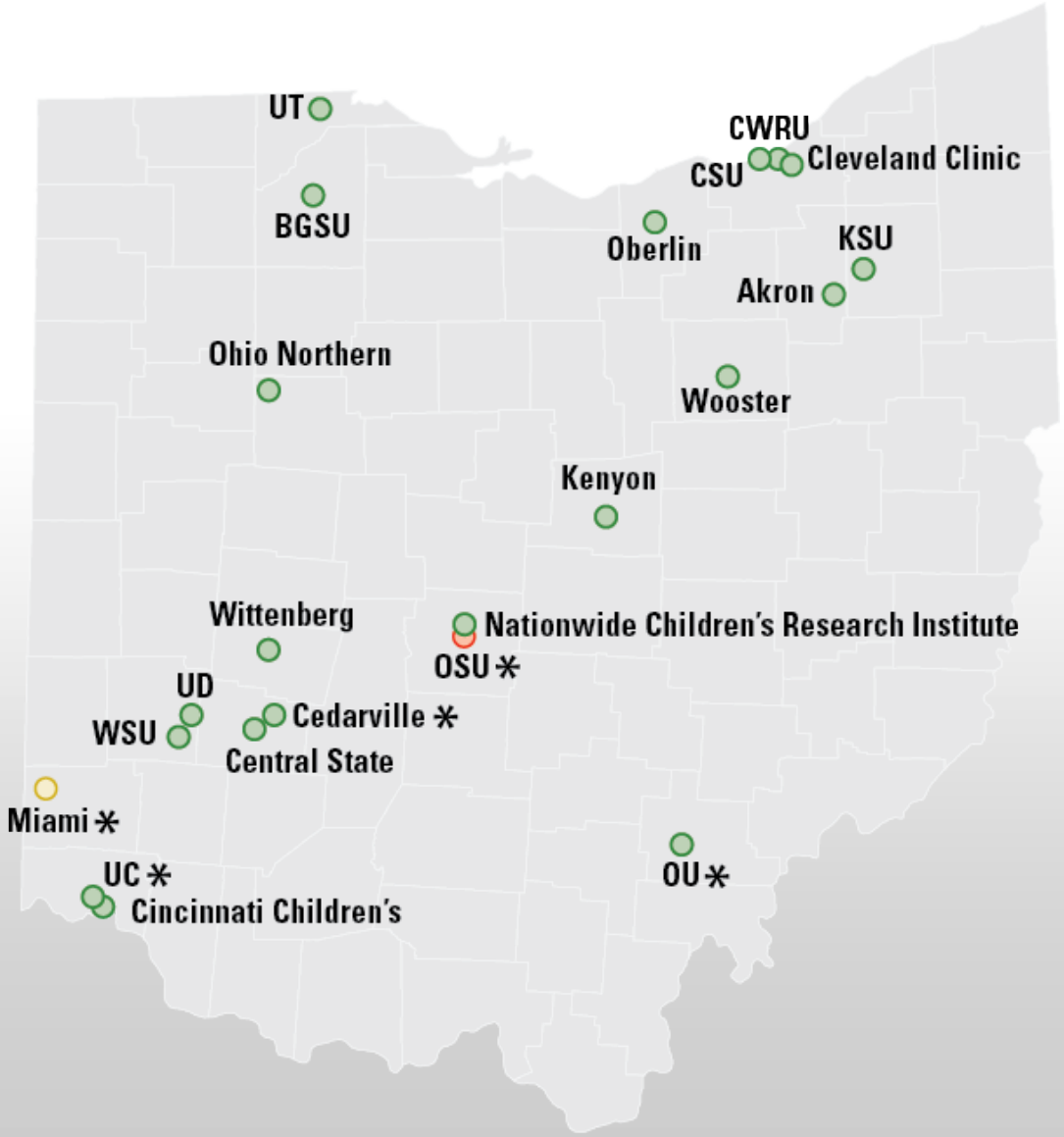
- Production Capacity
  - **87+ million CPU core-hours** delivered
    - Over **2.2 million jobs**
  - **975 TB data storage** space in use
  - **99.2% uptime** (target: 96% cumulative uptime)*
- Client Service Summary
  - **25 universities** served around the state**
  - **239 projects** received allocations***
  - **1173 individuals** ran a computing simulation or analysis
  - **155 individuals** attended **10 training opportunities**

446 Active Projects



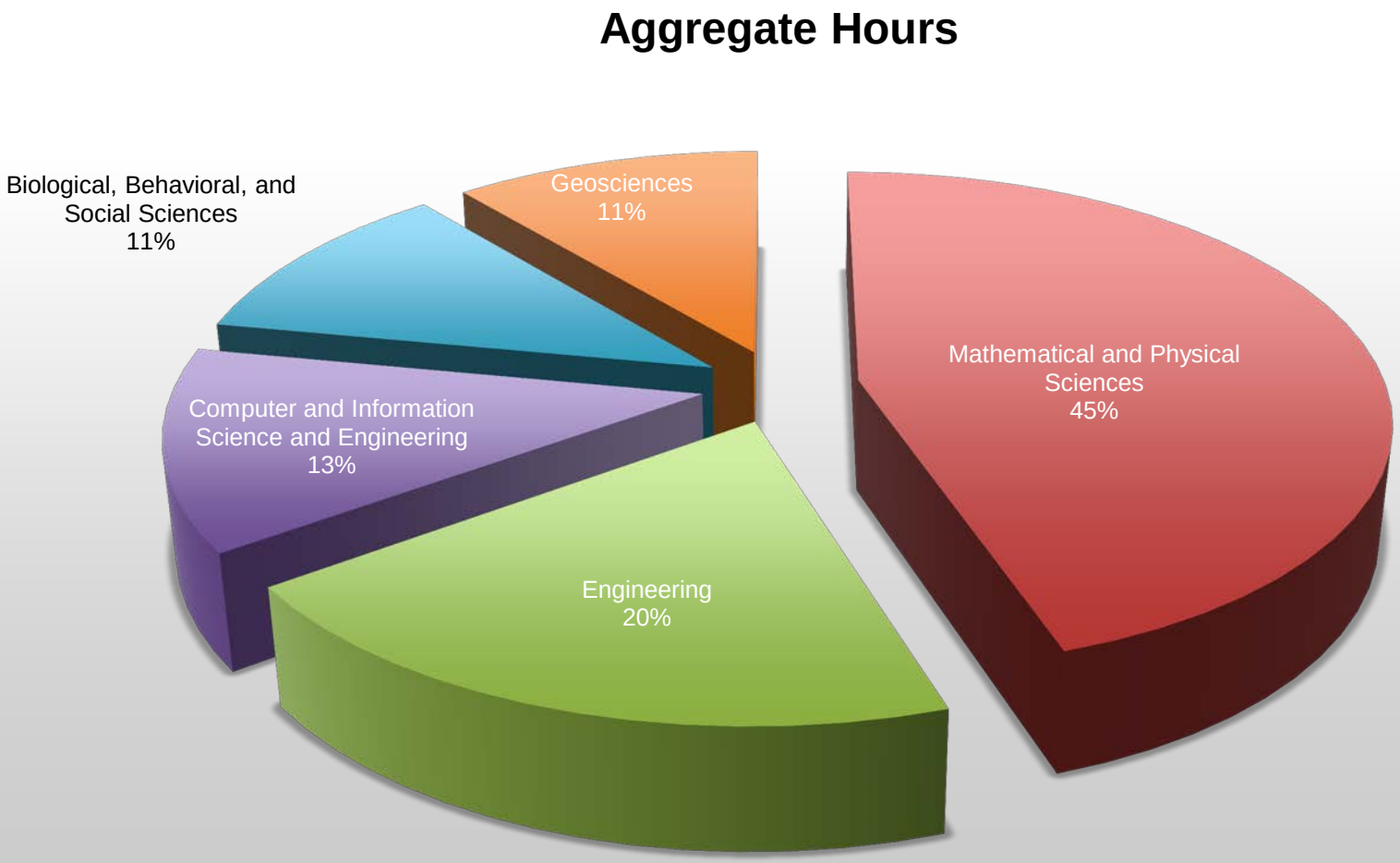
- 1 – 5
- 6 – 10
- 11 – 20
- 21+

124 New Projects



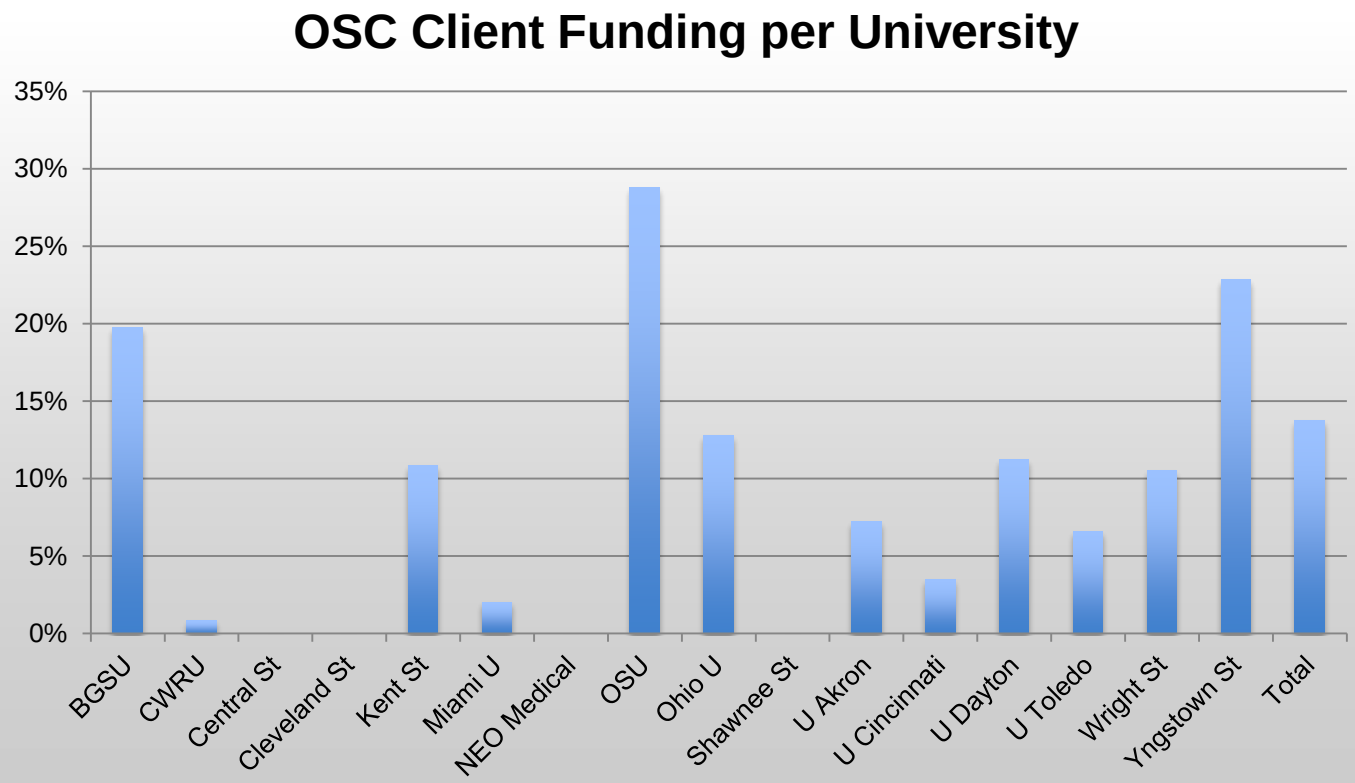
- 1 – 5
- 6 – 10
- 11 – 20
- 21+
- ✳ Classroom Project

Computing Resource Usage (by Field of Science)*



Funded Research of OSC Clients

Of the $1,090M in research funds (CY2014 active awards) from NIH, NSF and the DOE Office of Science, OSC clients accounted for $150M or 14% of that funding.



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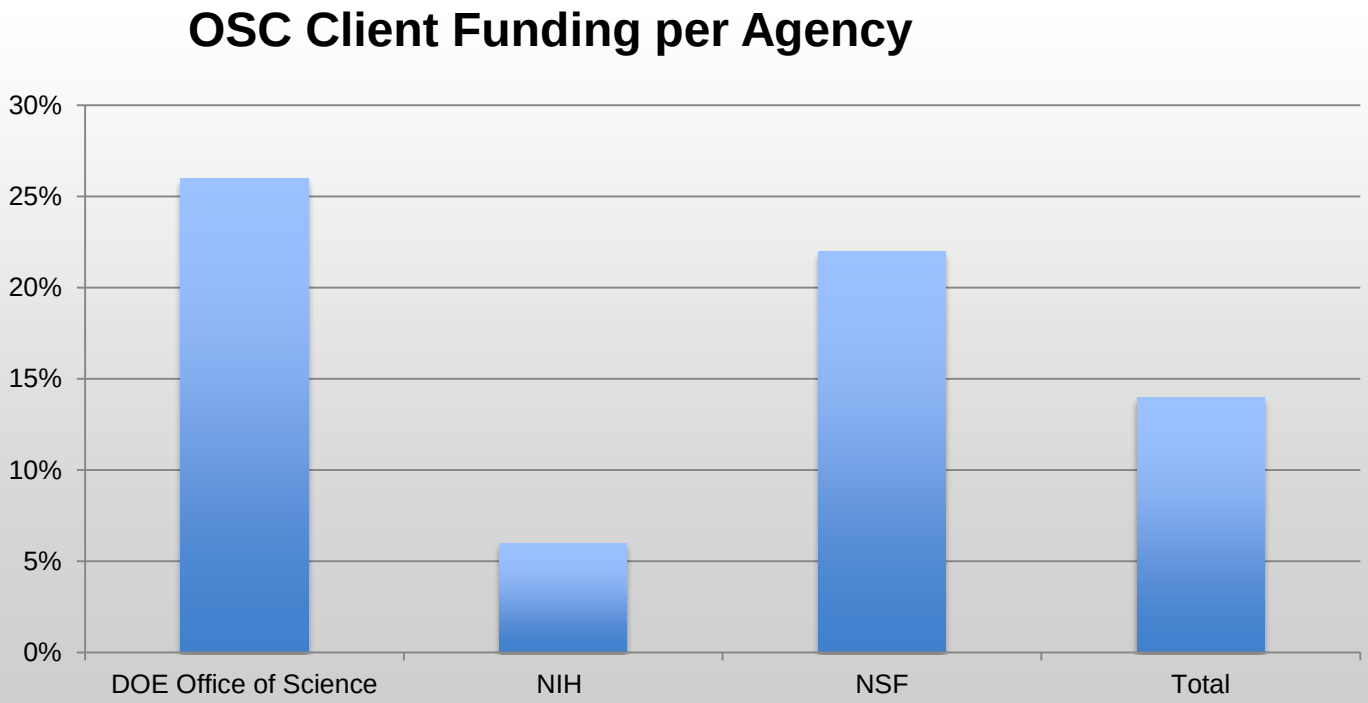


Personnel notes: Welcome new staff!

Troy Baer
HPC Systems

Kate Cahill
Training and Education

Kevin Manalo
Scientific Applications

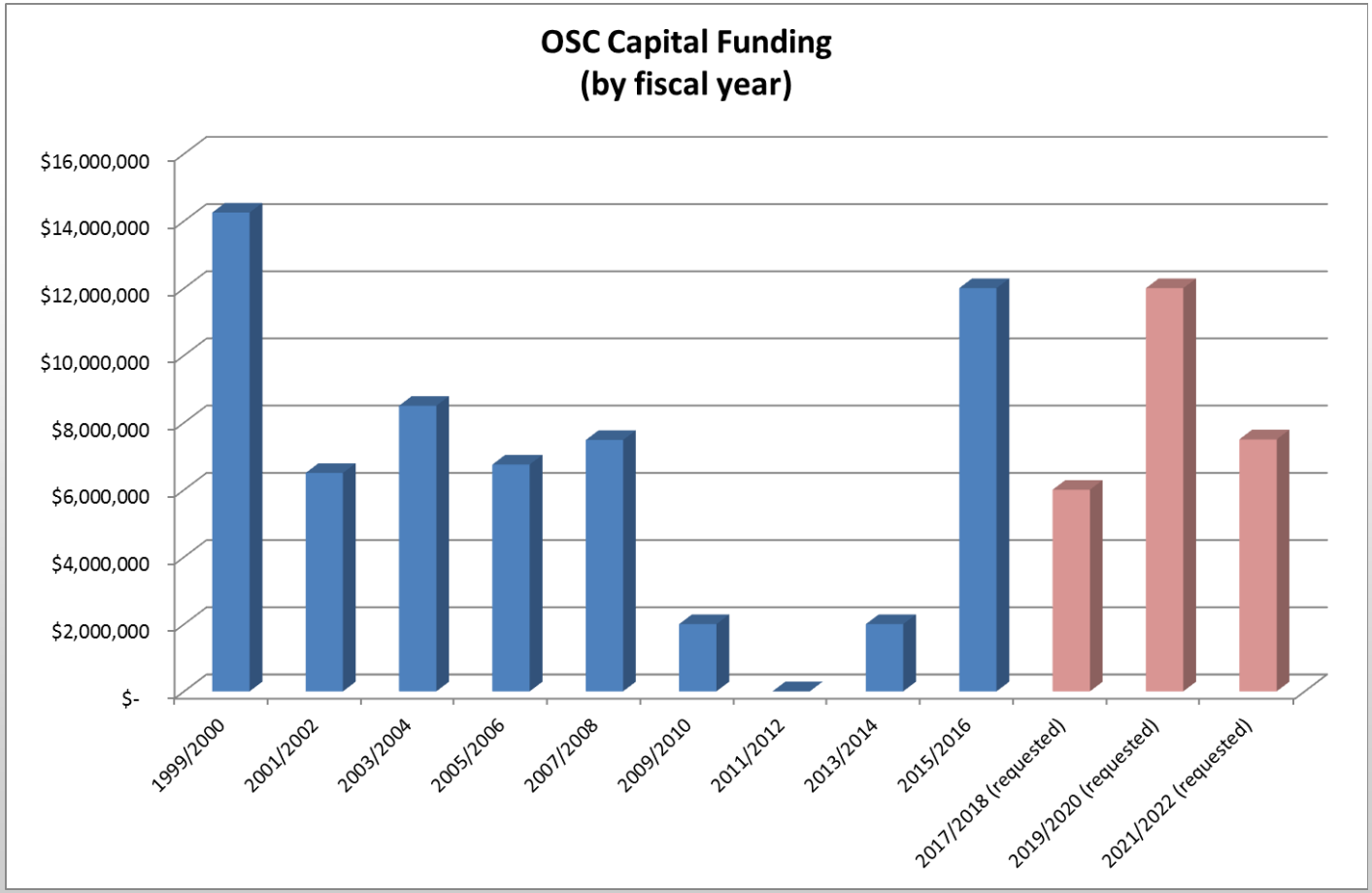
Heechang Na
Scientific Applications

Shameema Oottikkal
Data Applications

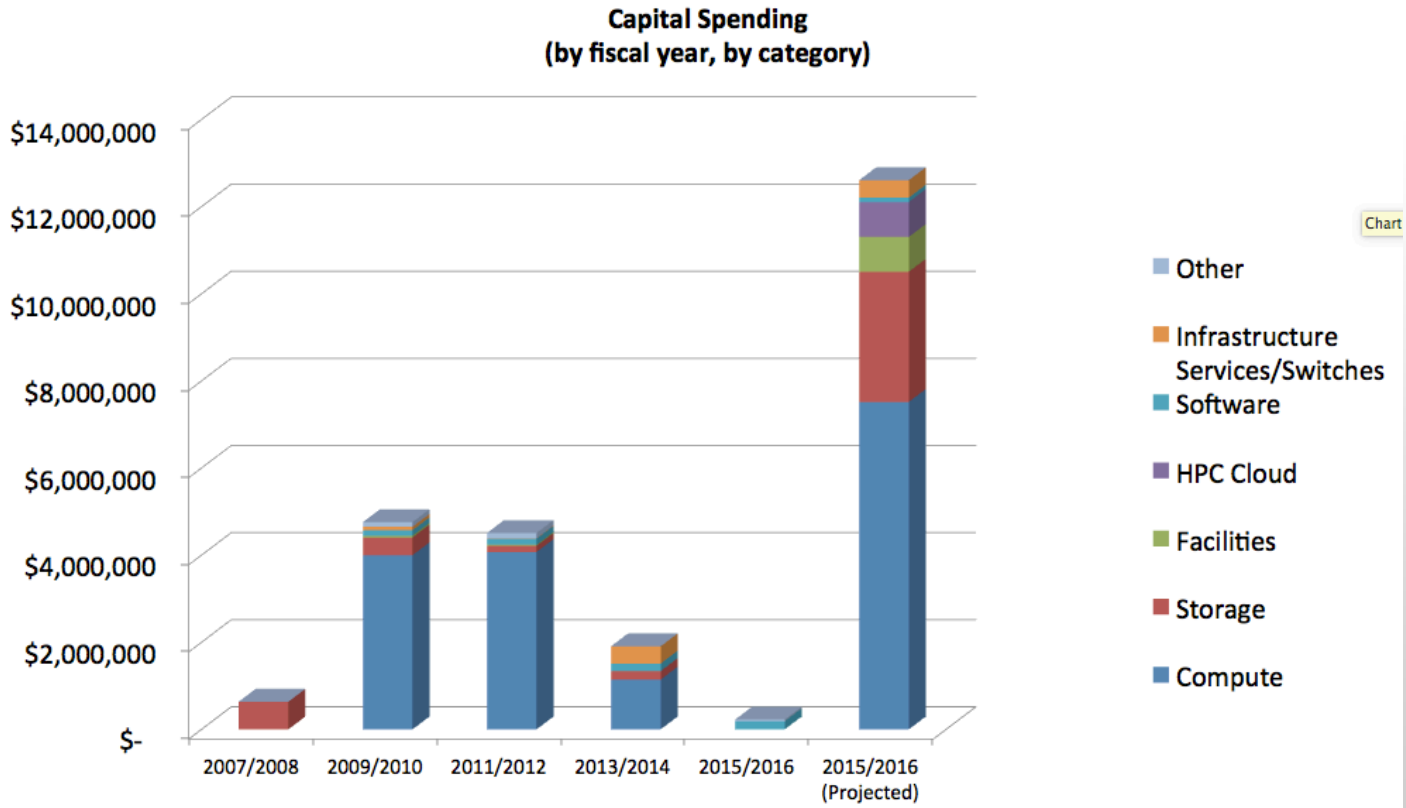
Personnel notes: Outstanding positions

- HPC Systems Engineer (Systems Administration)
- HPC Systems Engineer (Web &Security Infrastructure)
- AweSim Sales Representative

Capital Allocation History and Projections



Capital Spending Historical Trends



OSC Service Catalog

Cluster Computing • High Performance Computing • High Throughput Computing • Data-intensive Computing	**Research Data Storage** • Project Storage • Archival Storage
Client Services • 24x7 Call Center • Level 2 Engineering Support	**Client Facilitation** • Consultation (in-person and online) • Training and Education • Classroom accounts
Scientific Software Development • Software Development • Software Parallelization	**Web Software Development** • Software Development • Software Consulting
Partner on Proposals • Cyberinfrastructure solutions • Modeling & simulation for industry	**Visualization & Virtual Environments** • Visualization Services • Virtual environments (DSL)

Current Status on Condo/Hosting Agreements

- Pilot Condo Partnerships (Individual Researchers and Centers)
  - Center of Cosmology and Astro Particle Physics (CCAPP): 21 nodes
  - Datta Gaitonde, Mechanical and Aerospace Engineering: 96 nodes
  - Sameek Roychowdhury, Medical Oncology: 2 nodes
  - Honda SimCenter: integrated a rack of remote desktops into OSC systems
- In talks regarding institution level engagements
  - OSU Colleges
  - UC (UCIT)
  - Miami University

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Roadmap

FY16 Supercomputer and Storage Acquisitions

Timeline	
Issue RFP	March 2015, after Red Team review
Vendor selection	October 2015
Storage delivery	February 2016
Cluster delivery	April 2016
Production operation	May/June 2016

The new resources will increase compute capacity by 4x and storage capacity by 3x.

C16, Ruby, & Oakley: System Configurations

	C16 System (2016)	Ruby System (2014)	Oakley System (2012)
Theoretical Peak Performance	~750 TF (CPU only, GPUs to be added later)	96 TF + 28.6 TF (GPU) + 20 TF (Xeon Phi) ~144 TF	88.6 TFs + 65.5 TFs (GPU) ~154 TF
# Nodes	~820	240	692
# CPU Sockets	~1640	480	1384
# CPU Cores	~23,500	4800	8304
# / Kind of Accelerators	Up to 320 PCIe cards	20 NVIDIA Tesla K40 20 Xeon Phi 5110p	128 NVIDIA M2070s
Total Memory	~120 TB	~15.3 TB	~33.4 TB
Memory per Node	128 GB, or 1.5TB	64 GB	48 GB
Memory per Core	>5 GB	3.2 GB	4 GB
Interconnect	EDR IB	FDR/EN IB	QDR IB

File System Proposed Path

- Home Directories
  - Scalable NAS appliances
  - ~900 TB usable space (~300 TB today)
- Project
  - 3.4 PB usable space (~1.1 PB today)
  - 40-50 GB/s peak performance (8-9 GB/s today)
- Scratch
  - 1 PB usable space (~570 GB today)
  - 40-50 GB/s peak performance (~10 GB/s today)

Proposed File System Path

- Advanced caching layer
  - ~45 TB raw SSD capacity
  - 100 GB/s peak performance
    - Can be scaled by 50 GB/s building blocks
    - Capacity can be grown to meet storage working set size
  - Sits between file system clients and file servers
  - Significant performance advantage for small or unaligned writes
  - Evens out performance to slower tiers of the file system
  - New software, not risk/problem free

FY16 : GPU additions and HPC Cloud

- GPU additions to C16 cluster
- HPC Cloud Project
  - Some existing capital earmarked for a “cloud compute” service
  - Early design phase, collecting requirements
  - Expect to deploy in FY17

Proposed 2017/2018 Biennium Request : Next Gen Transitional Cluster, storage expansion/upgrades

- Next Gen Cluster
  - Introduce transitional cluster with new technologies
  - Expect to deploy in mid to late FY17
- Storage expansion/upgrades
  - Increase file system performance by growing advanced caching layer
  - Introduce tier of storage with large capacity, but lower performance
  - Upgrades to capacity and performance of tape library

Proposed 2019/2020 Biennium Request : New Production Resources

- Substantial new system with latest technologies
  - High-speed network integrated with CPU
  - High bandwidth memory
    - More tiers of memory
  - Non-volatile memory
    - Faster than SSD
    - More tiers of storage
  - Heterogeneous architecture