OH·TECH

Statewide Users Group Meeting

Aravind Asthagiri, Chair
The Ohio State University

April 11, 2013

Staff at SC2013

Bill Feiereisen, Intel

Pankaj Shah, Executive Director
Ohio Supercomputer Center & OARnet

Executive Update

OSC: Celebrating 25 Years of Supercomputing

1987

Ohio Board of Regents establishes Ohio Supercomputer Center

August 1989

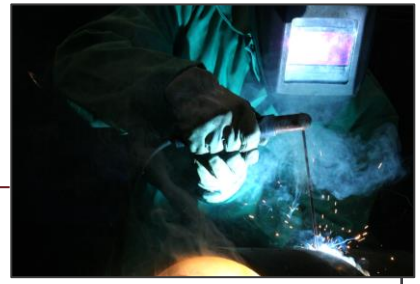
OSC installs Cray Y-MP

1999

Built SGI Cluster at SC'99

2004

Highly scalable, fiber-optic network lit by OSCnet, now OARnet



Blue Collar Computing launched to support industry HPC needs

Ralph Regula School of Computational Science
an initiative of the Ohio Supercomputer Center

December 2005 Dedicated virtual computational science school

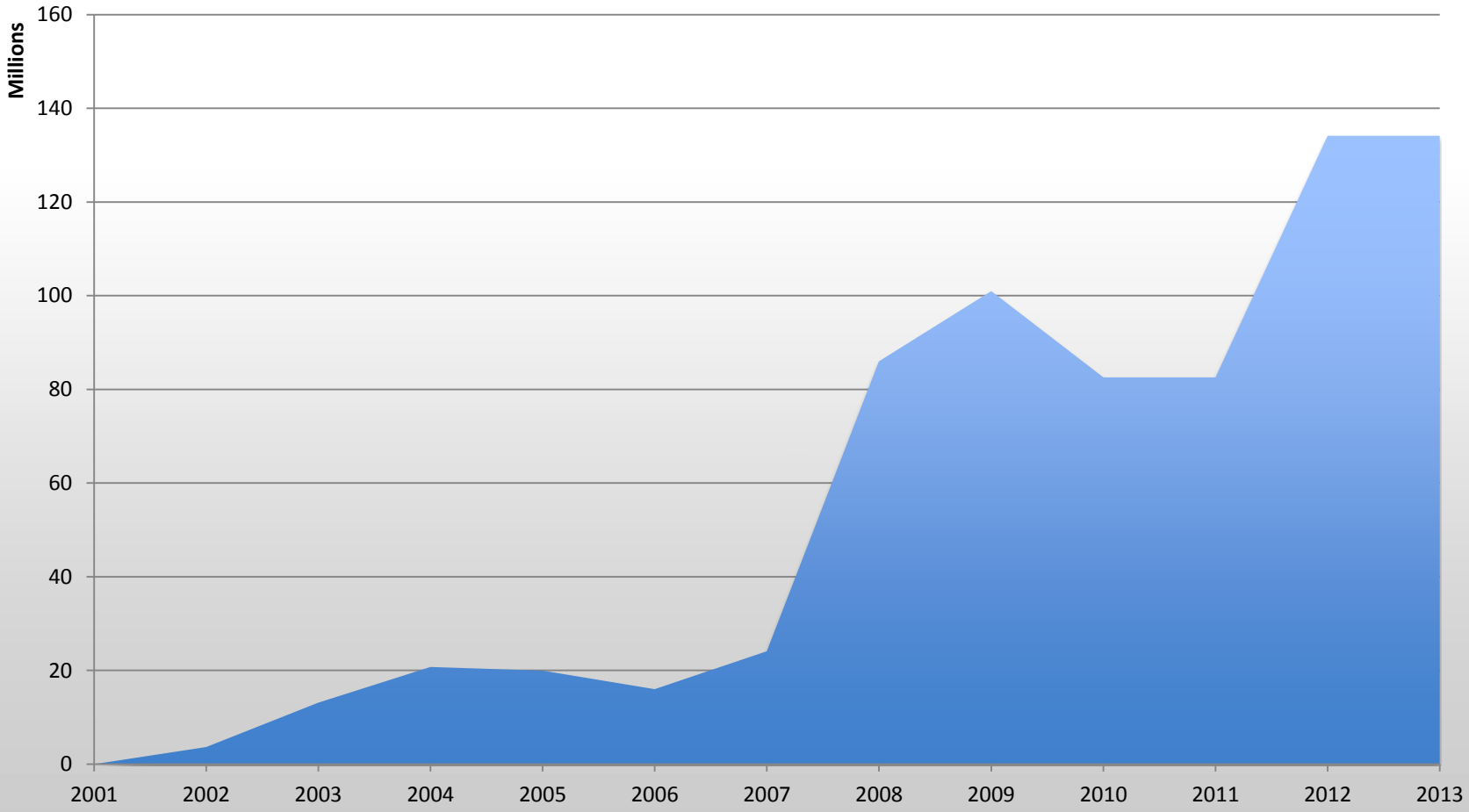
OH·TECH

2011
Regents create the Ohio Technology Consortium

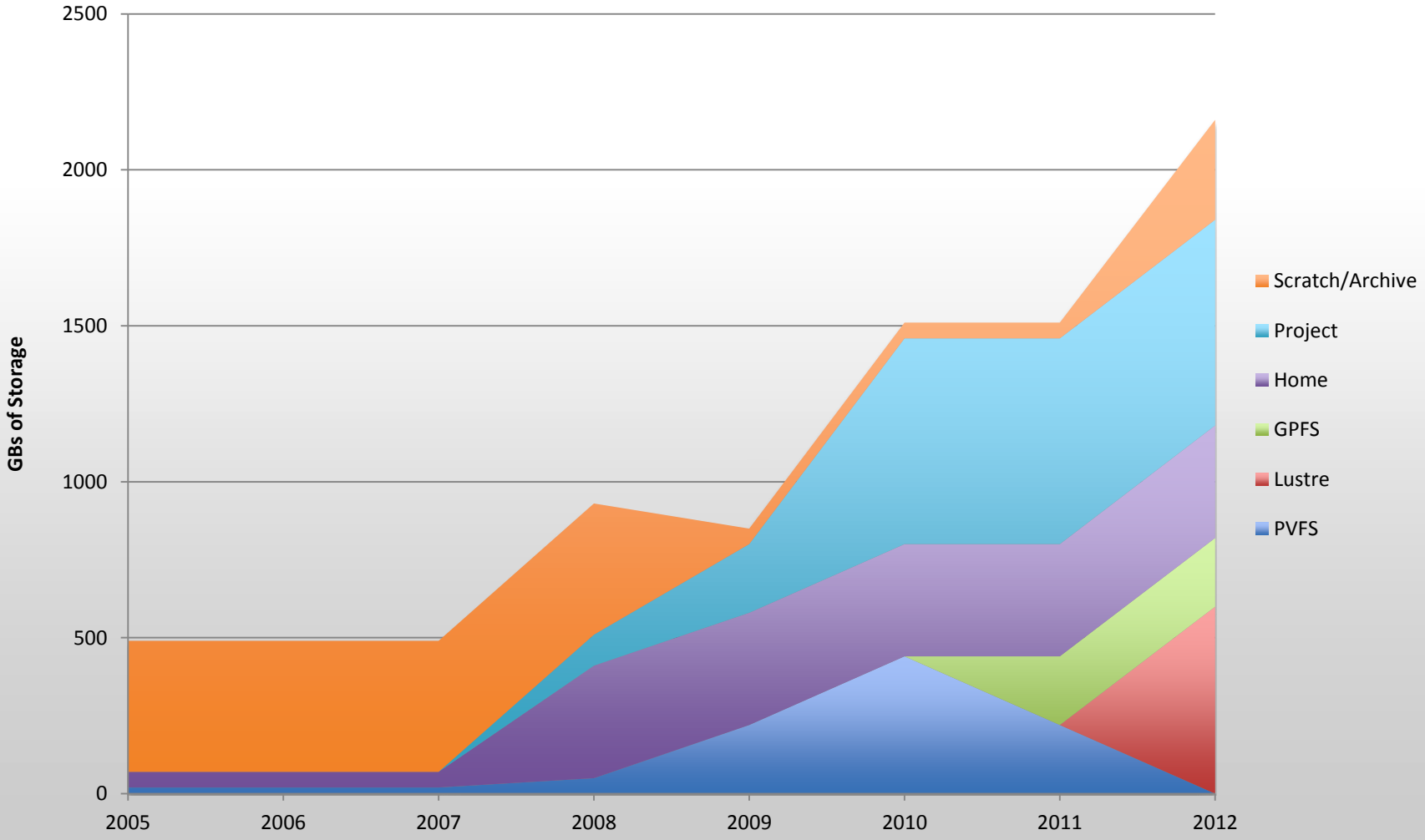
Ohio Supercomputer Center

- Purpose: Propel Ohio's research universities and private industry to forefront of computational based research
- Established OARnet at same time to provide access to OSC
- Our duty is to:
  - Empower our clients
  - Partner strategically to develop new research and business opportunities
  - Lead Ohio's knowledge economy

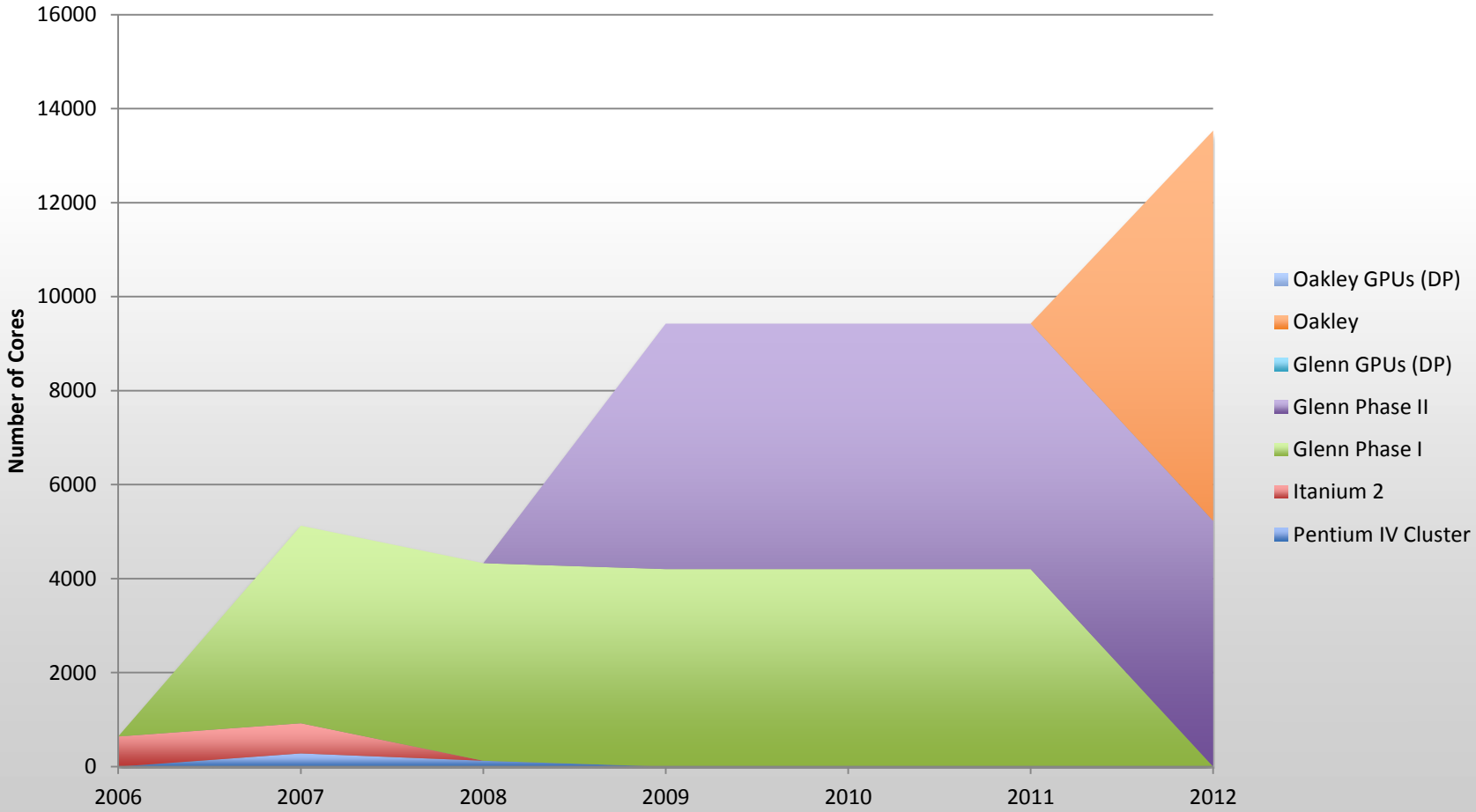
Total Compute Hours Available at OSC



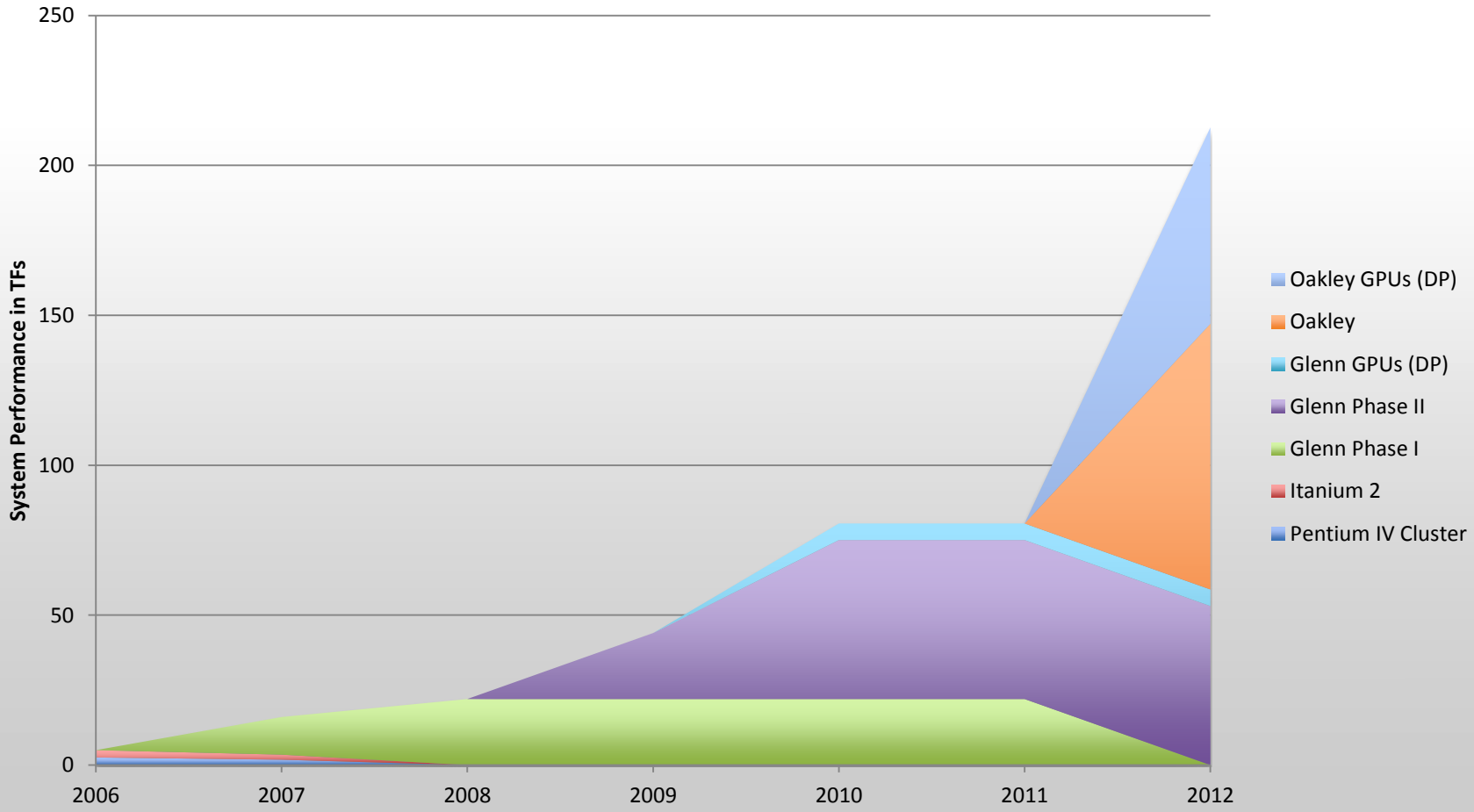
All OSC Storage in GigaBytes



Total Number of Computer Cores at OSC



OSC System Aggregate Performance Growth



Science DMZ: Project Overview

- $987,019 NSF Grant
  - Carol Whitacre PI, OARnet/OSC's Prasad Calyam co-PI
- Science DMZ construction with advanced technologies
  - 100-Gbps connectivity, perfSONAR, OpenFlow, RoCE/iWARP, Bro
- Connect OSU at 100Gbps to OARnet-Internet2 peered network
  - Aggregate research VLANs arising from internal OSU departments
- Define and establish role of a "Performance Engineer on Campus"
  - App development to help operations, policy development, funding model
- Wide-area experimentation case studies with Co-PIs
  - *OSU – MU experiments*: Brain imaging, Soybean translational genomics
  - *OSC experiments*: adoption of cloud-based technologies for big-data import, storage and collaboration, as well as related analytics
  - *OSU HFCMPL experiments*: foster multi-physics research collaboration and high-resolution simulation steering; graduate capstone project

Wright Patterson Air Force Base Research Initiative

- 10Gb connectivity to Base
- AFRL
  - Direct connectivity to base clusters for research
- DREN peering
  - Connect to research network in support of Ohio based R & D
- Identify current University Research projects which will benefit from the expanded connectivity and peering
- Promote development of new projects due to expanded relationship with WPAFB and DREN

Ohio Third Frontier
Innovation Platform Proposal

Ohio | Third Frontier
Innovation Creating Opportunity

- Proposal to commercialize the proof of concept, developed through Blue Collar Computing and NDEMC, to provide modeling and simulation to small and medium size businesses
- Called Intelligent Simulation Platform (IntelSim)
  - Offerings would be via portals, expertise, software, training, etc.
- Total proposal is for $6.4 million
  - $3 million would come from the state
  - $3.4 million would be in cost share from our partners:
    - TotalSim, AltaSim, Kinetic Vision, Nimbis Services, P&G, Intel

NDEMC Project

- OSC actively supports 13 of 20 board-approved projects of National Digital Engineering & Manufacturing Consortium (NDEMC)
- Funded by the Economic Development Administration

NDEMC
Leading 21st Century Manufacturing

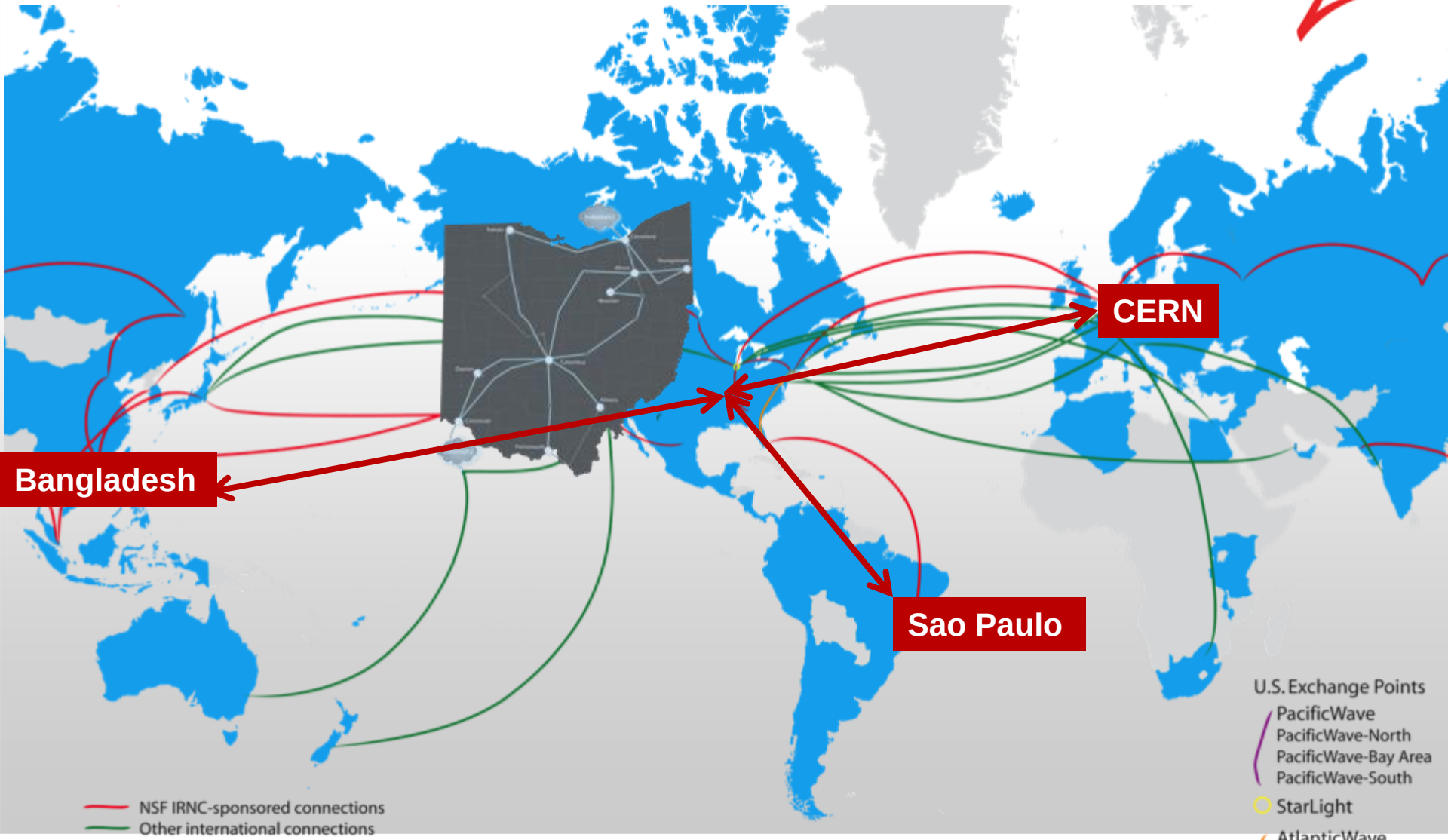
OSC NDEMC projects include:

- **Greenlight Optics**
  Loveland, Ohio
- **Morrison Products**
  Cleveland, Ohio
- **AltaSim Technologies**
  Columbus, Ohio
- **Jeco Plastics**
  Plainfield, Indiana
- **Replex Plastics**
  Mount Vernon, Ohio
- **Applied Sciences**
  Cedarville, Ohio
- **Plastipak**
  Medina & Jackson Center, Ohio
- **KLW Plastics**
  Monroe, Ohio
- **Midwest Precision**
  Eastlake, Ohio
- **Technology Management Inc.**
  Highland Heights, Ohio
- **Engendren**
  Kenosha, Wisconsin

OSU Driving Simulation Center

- $1.3 million OSU Driving Simulation Laboratory opened Oct. 19
- Will help researchers study driver distraction and how to prevent it
- State-of-the-art 5,800-square-foot facility
- Partnership between Ohio State, Honda R&D Americas, Inc., and the Ohio Supercomputer Center

OSC Innovates with the World



OSC/OARnet Research – FY 13

Awards to Date (July 01, 2012 to March 31, 2013)

	Federal/Private Awards to Date	State of Ohio Awards to Date	All Awards to Date
OSC/OARnet Funding	$572,132		$572,132
OSU Funding	$378,183		$378,183
Partners Funding	$1,506,918		$1,506,918
Total Funding	$2,457,233		$2,457,233
Total Number Awards	7		7
Awards with OSC/OARnet as Lead	4		4

Based on Reported Dollars

OSC/OARnet Research – FY 13

Pending to Date (as of 03/31/13)

	Federal/Private Pending to Date	State of Ohio Pending to Date	All Pending to Date
OSC/OARnet Funding	$1,817,747	$2,689,031	$4,506,778
OSU Funding	$2,011,440	$749,084	$2,760,524
Partners Funding	$1,671,008	$2,712,411	$4,383,419
Total Funding	$5,500,195	$6,150,526	$11,650,721
Total Number Pending	8	3	11
Pending with OSC/OARnet as Lead	2	1	3

Based on Reported Dollars

OSC Financial Update

	Budget	Forecast	Variance
Sources of Revenue			
User Fees	200,000	566,246	366,246
Grant/Contracts	1,806,651	2,024,185	217,535
Other Funding	0	0	0
Regents Funding (Higher Ed Subsidy)	3,347,412	3,347,412	0
Operating/Reserve Transfers	0	0	0
Total Revenue	**5,354,063**	**5,937,844**	**583,781**
Operating Expenses			
Personnel/Benefits	3,392,056	3,334,317	(57,739)
Equipment Maintenance	100,000	120,541	20,541
Equipment	16,000	25,000	9,000
Other Operating Expenses	2,200,609	2,492,164	291,555
Operating/Reserve Transfers		0	0
Total Operating Expenses	**5,708,665**	**5,972,023**	**263,357**
Net Income (Loss)	**(354,603)**	**(34,179)**	**320,424**

OSC Financial Updates (cont.)

- Financial outlook
  - Revenue projections higher
  - Personnel expenses on track, slightly lower than budget
  - Other expenses higher because of increase in project costs

2013 Focus Areas for OSC

- Strategic hires
- Funding opportunities and business model development
- Faculty-joint appointments!
- Beyond NDEMC (National Digital Engineering and Manufacturing Consortium)
- Big data management
- Research compute and storage infrastructure
- Campus outreach, regional alliances

Gov. John Kaisch launches the 100 Gig network.

OARnet Updates

25 years of innovation

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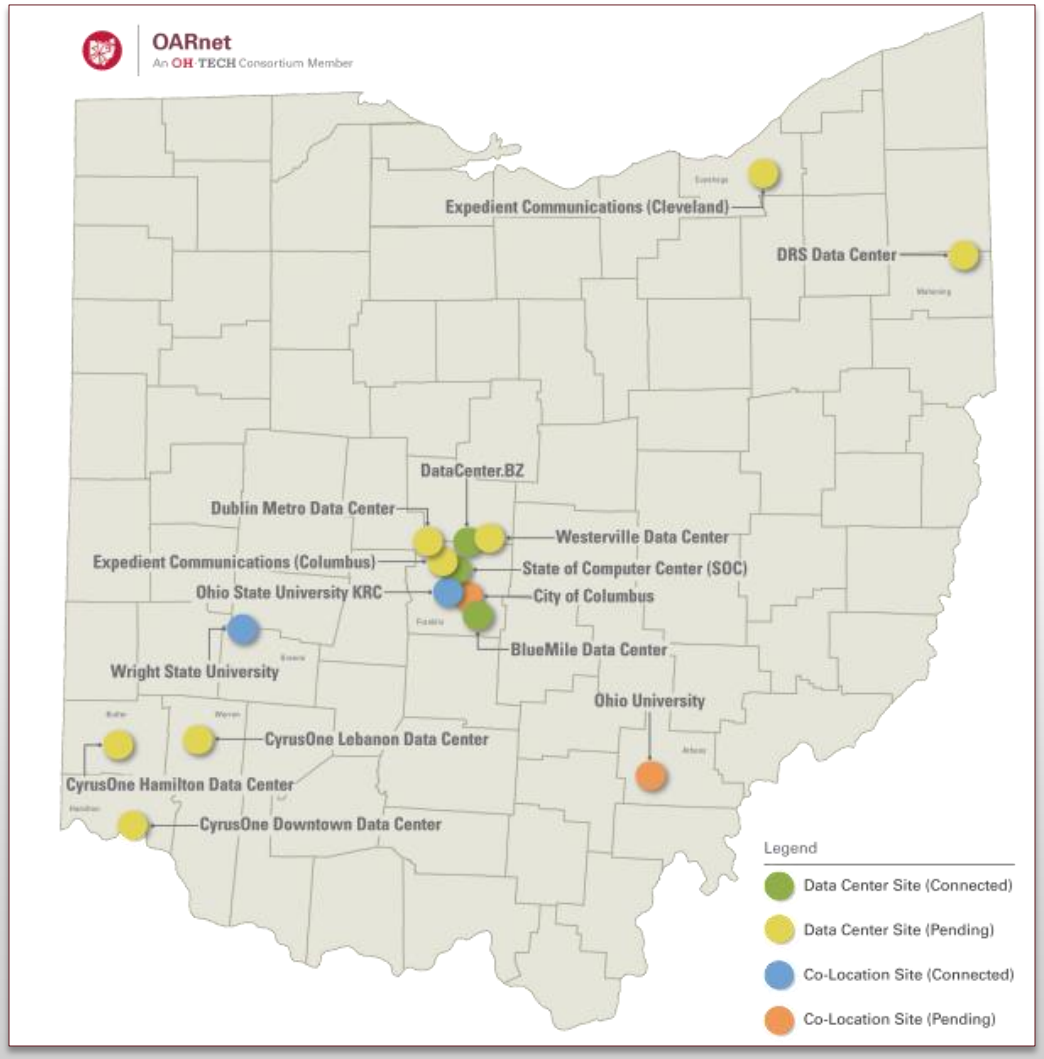
Launched Ohio's 100 Gigabit per Second Network

New Data Center and Co-location Sites

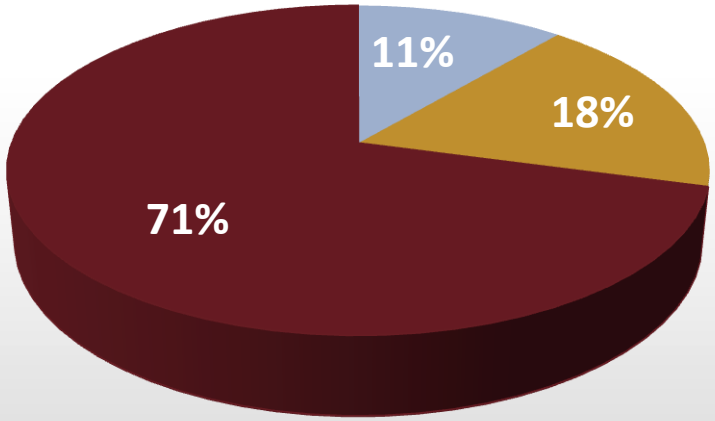
- IUC selected CyrusOne, DataCenterBZ and Expedient for 10 year contract
  - Primary data center, disaster recovery and cloud services
- Additional centers connected at request of members
  - City of Westerville
  - City of Columbus
  - City of Dublin
  - DRS Youngstown
  - BlueMile
  - State of Ohio Computer Center
  - Wright State University
  - Ohio State University
  - Ohio University



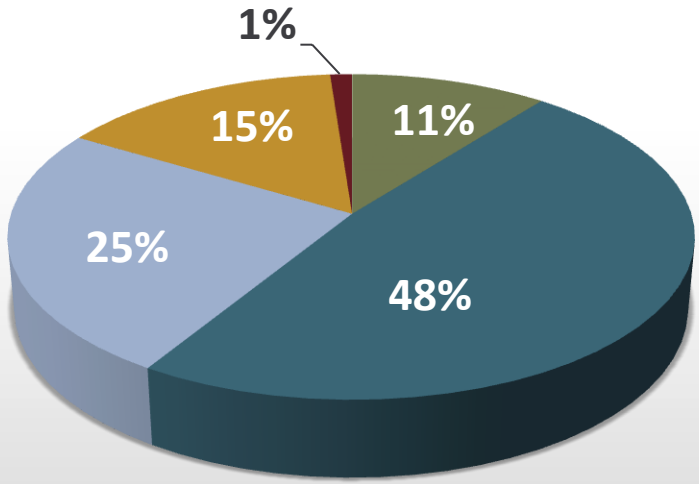
Last Mile Connections

Change in last-mile connections to higher education organizations

Prior to OARnet Implementation 2003



Current OARnet Connections 2012



- 10 Gigabit
- 1-9 Gigabits
- 100-999 Mbs
- 10-99 Mbs
- 9 Mbs or less

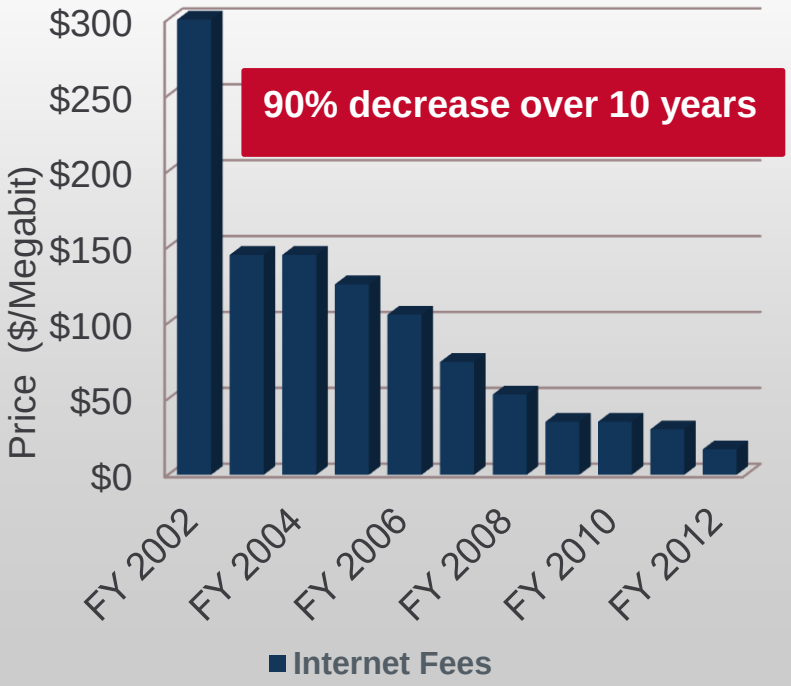
Capacity	Prior to OARnet Implementation 2003	Current OARnet Connections 2012
100 Gigabits (pending)	**0**	**3**
10 – 99 Gigabits	0	6
1 Gigabit – 9 Gigabits	0	41
100 Mbs – 999 Mbs	10	21
10 Mbs – 99 Mbs	16	13
9 Mbs or less	63	1

Updated September 5, 2012

Overview: History of Pricing vs Subscriptions

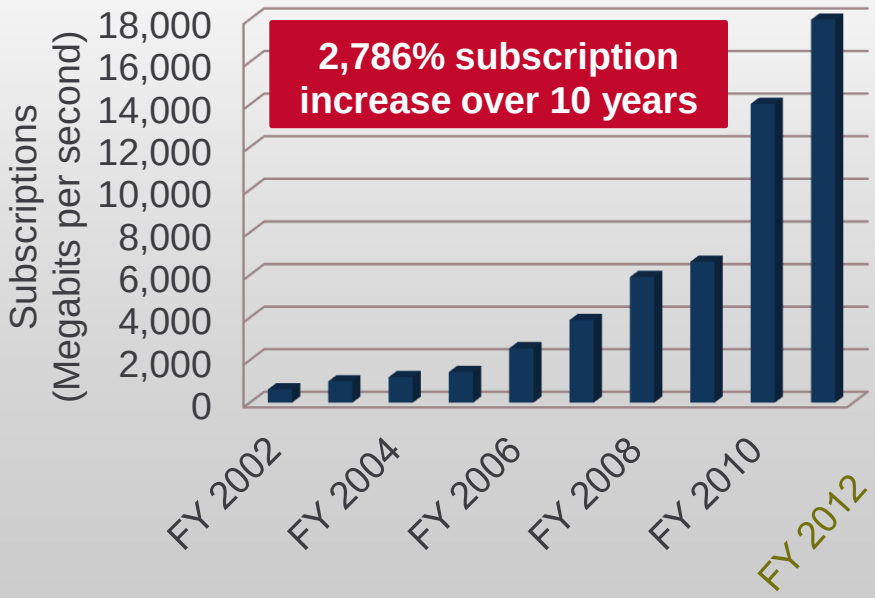
Reduction of Expenses – Economies of Scale

Historical Internet Pricing
P-20; FY2002 – FY2011



Power of Aggregation

Historical Internet Subscriptions
P-20; FY2002 – FY2012



2013 Focus Areas for OARnet

- Federation and identity management
- Applications/Net+ services
- Business models and new pricing schema
- Succession planning
- Strategic hires
- Data centers
- State of Ohio transformation project/process
- Fiber IRUs
- CC-NIE

The OH-TECH Consortium

Ohio Supercomputer Center provides high performance computing, software, storage, and support services for Ohio's scientists, faculty, students and businesses.

OARnet connects Ohio's universities, colleges, K-12, health care and state and local governments to its high-speed fiber optic network backbone. OARnet services include co-location, support desk, federated identity and virtualization.

OhioLINK serves nearly 600,000 higher education students and faculty by providing a statewide system for sharing materials and aggregating costs among its 90 member institutions.

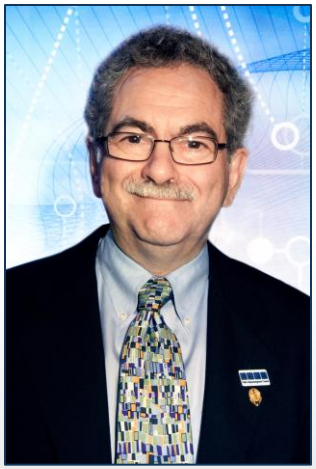
eStudent Services provides students increased access to higher education through e-learning and technology-enhanced educational opportunities, including virtual tutoring.

Research & Innovation Center will operate, when opened, as the proving grounds for next generation technology infrastructure innovations.

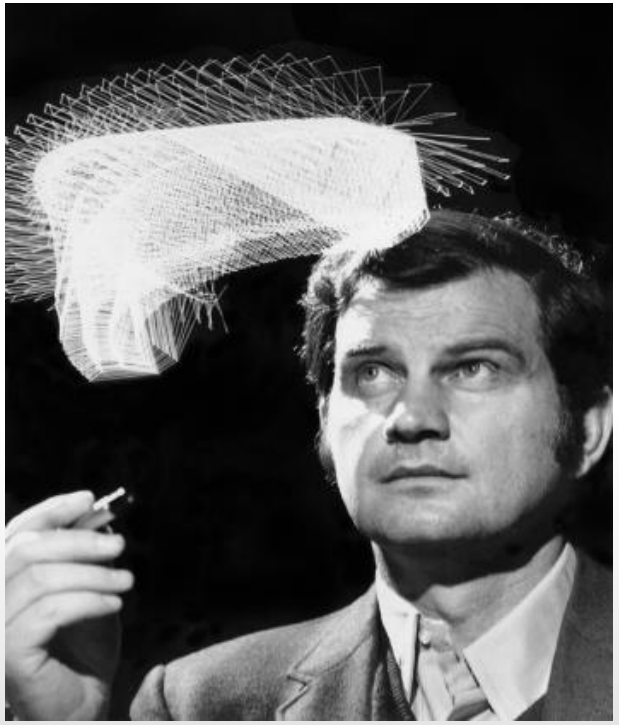
OSC & OARnet Advisory Board

- Aravind Asthagiri
  Statewide Users Group Chair
  The Ohio State University
- Stuart Davis
  State of Ohio
  Office of Information Technology
- Duane Detwiler
  Honda R&D Americas, Inc.
- Gwen Evans
  OhioLINK
- Lev Gonick
  Case Western Reserve University
- Tom Lange
  Procter & Gamble
- Scott McKim
  Nationwide Bank
- James Oris
  Miami University
- Mark Patton
  JobsOhio
- Rick Penny
  Chair of Two-year Schools
  Lakeland Community College
- Chuck Warner
  Chair of IUC
  Shawnee State University
- Caroline Whitacre
  The Ohio State University
- Erik Yassenoff
  Governor's Office

Thank You, Steve Gordon



Congratulations on your retirement and
many thanks for your rich contributions
to the Ohio Supercomputer Center, OARnet,
and The Ohio State University, and for your leadership in national forums.



Charles Csuri, father of digital art

Christopher Hadad, The Ohio State University

Allocations Committee Report

Start-Up and Classroom Allocations
Total of 35 (!) – 175,000 RUs

1. **Robert Marcus, Mathematics and Computer Science, CES, classroom, 5,000**
2. **Herman Shen, Mechanical and Aero Engineering, OSU, classroom, 5,000**
3. Theresa Ramelot, Chemistry and Biochemistry, MIU, start-up, 5,000
4. Keith Slotkin, Molecular Genetics, OSU, start-up, 5,000
5. Ahmed abdel Mohti, Civil Engineering, OHNU, start-up, 5,000
6. Haijun Su, Mechanical and Aero Engineering, OSU, start-up, 5,000
7. Mireia Guerau, Neurology, OSU, start-up, 5,000
8. Casey Hoerig, Pharmacy, OSU, start-up, 5,000
9. Venu Dasigi, Computer Science, BGS, start-up, 5,000
10. Jihun Hamm, Computer Science, OSU, start-up, 5,000
11. **Timothy Sullivan, Physics, KYC, classroom, 5,000**
12. Arnab Nandi, Computer Science and Engineering, OSU, start-up, 5,000
13. Craig McElroy, Pharmacy, OSU, start-up, 5,000
14. **Ponnuswamy Sadayappan, Computer Science and Engin., OSU, classroom, 5,000**
15. Benjamin Passty, Economics, UCN, start-up, 5,000
16. Paula Mouser, Civil and Environmental Engin. and Geodetic Sciences, OSU, start-up, 5,000
17. **Jenping Chen, Mechanical and Aero Engineering, OSU, classroom, 5,000**

To be continued……..

Start-Up and Classroom Allocations (total of 35 – 175,000 RUs)

18. Peng Wang, Mathematics and Statistics, BGS, start-up, 5,000
19. Mesfin Tsige, Polymer Science, UAK, start-up, 5,000
20. Alvaro Montenegro, Geography, OSU, start-up, 5,000
21. **Christopher Hadad, Chemistry, OSU, classroom, 5,000**
22. Wei Zhang, Materials Science and Engineering, OSU, start-up, 5,000
23. Zhong-Lin Lu, Psychology, OSU, start-up, 5,000
24. Sameek Roychowdhury, Medical Oncology, OSU, start-up, 5,000
25. George Muschler, Orthopaedics and Biomedical Engineering, CCF, start-up, 5,000
26. Syed Qutubuddin, Chemical Engineering, CWR, start-up, 5,000
27. Robert Siston, Mechanical and Aero Engineering, OSU, start-up, 5,000
28. Kumar Vikram Singh, Mechanical and Manufacturing Engineering, MIU, start-up, 5,000
29. Allen McGrew, Geology, UDA, start-up, 5,000
30. Abdollah A Afjeh, MIME, UTL, start-up, 5,000
31. Tammy Morrish, Biochemistry and Cancer Biology, UTL, start-up, 5,000
32. Andrew Michel, Entomology, OSU/OARDC, start-up, 5,000
33. Junmin Wang, Mechanical and Aero Engineering, OSU, start-up, 5,000
34. James Fowler, Mathematics, OSU, start-up, 5,000
35. Michael Pennell, Biostatistics, OSU, start-up, 5,000

OSU: 17/**4** CES: **1** MIU: 2 OHNU: 1 BGS: 2 KYC: **1** UCN: 1
UAK: 1 CCF: 1 CWR: 1 UDA: 1 UTL: 2

Major Allocation Requests

Total of 17 – 2,550,000 RUs

1. *Keiko Akagi, MVIMG, OSU, standard, 10,000*
2. *Dong Qian, Mechanical, Industrial, and Nuclear Engineering, UCN, standard, 10,000*

3. **Gil Bohrer, Civil and Environmental Engineering and Geodetic Sciences, OSU, Discovery, 100,000**
4. Joseph Heremans, Mechanical and Aero Engineering, OSU, major, 30,000
5. **John W Wilkins, Physics, OSU, Discovery, 650,000**
6. Barry Dunietz, Chemistry, KSU, major, 30,000
7. **Douglass Schumacher, Physics, OSU, Discovery, 400,000**
8. **Wolfgang Windl, Materials Science and Engineering, OSU, Discovery, 480,000**
9. **Robin Selinger, Liquid Crystal Institute, KSU, Discovery, 60,000**
10. Elizabeth K Mann, Physics, KSU, major, 30,000
11. Amy Connolly, Physics, OSU, major, 30,000
12. **Richard J Furnstahl, Physics, OSU, Discovery, 100,000**
13. Richard J Furnstahl, Physics, OSU, major, 30,000
14. David Modarelli, Chemistry, UAK, major, 30,000
15. **Christopher Hadad, Chemistry, OSU, Discovery, 500,000**
16. Daniel Lacks, Chemical Engineering, CWR, major, 30,000
17. Wolfgang Sadee, Pharmacology, OSU, major, 30,000

OSU: 5/**6** UCN: 1 KSU: 2/**1** UAK: 1 CWR: 1

Start-Up Allocations (5,000 RUs each)

29 requests 145,000

Classroom Allocations (5,000 RUs each)

6 requests 30,000

Standard Allocations (10,000 RUs each) -- **2** requests

full awards: **2** 20,000

Major Allocations (30,000 RUs each) -- **8** requests

full awards: **8** 240,000

Discovery Allocations -- **7** requests

full awards: **5** (1 tabled)

partial awards: **1** 1,740,000

Total: 2,175,000

- Storage proposal (w/ RU usage): requested 10 TB (was approved)
- Discussed charging option for large enterprise storage requests
  - Will develop an algorithmic proposal in conjunction with OSC staff

Leslie Southern, center, led numerous classes to train users.

Brian Guilfoos, Science & Technology Support Manager
guilfoos@osc.edu

User Support, Education and Training

25 years of innovation

OH·TECH | Ohio Technology Consortium
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User Support Activities

- Added “Known Issues” to osc.edu/supercomputing
- Redesign of the main landing page
  - Goal: to make newer, more relevant content (hopefully) easier to find
  - Continual updating of web content
- Wider deployment of OnDemand
- Working on better definition of “project space” allocations
- Unexpected extension of the last downtime highlighted some areas where user communications could be improved
- General user support activities

Incidents

- 139 new tickets in the last 90 days
  - 75 in “High Performance Computing”
  - 42 in “Statewide Software Licensing”
  - 22 scattered across other categories
- 110 closed or resolved
- 16 active
- 13 waiting
- Working to capture larger percentage of work in the ticket system

Training

- Developing long-term training plan
  - Will include video tutorials and online materials
  - Have a broad vision of what we think needs to be there, and a good use of limited resources
  - Targeting shorter courses, rather than multi-day events
- Welcome requests for particular courses, or to come and present at other sites
  - Need remote partners to help put us in contact with people who can manage site logistics!

Dave Hudak, Program Director for HPC Engineering

dhudak@osc.edu

HPC Engineering Update

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OSC OnDemand

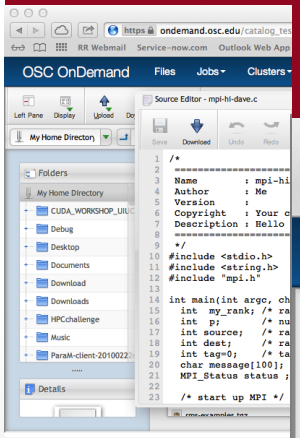
1: User Interface
- Web based
  - Usable from computers, tablets, smartphones
  - Zero installation
- Single point of entry
  - User needs three things
    - ondemand.osc.edu
    - OSC Username
    - OSC Password
  - Connected to all resources at OSC

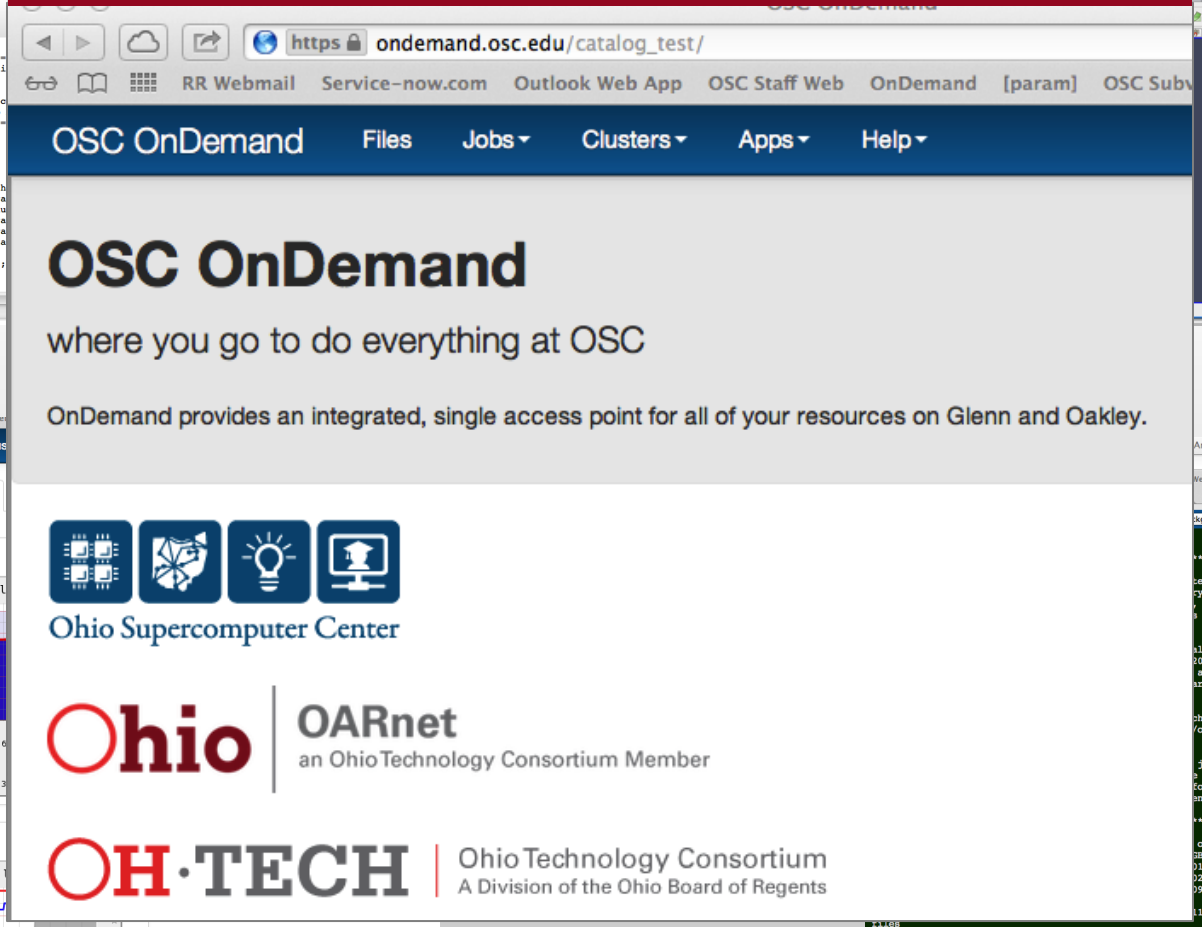
2: Interactive Services
- File Access
- Job Management
- Visualization Apps
  - Desktop access
  - Single-click apps (Abaqus, Ansys, Comsol, Paraview)
- Terminal Access

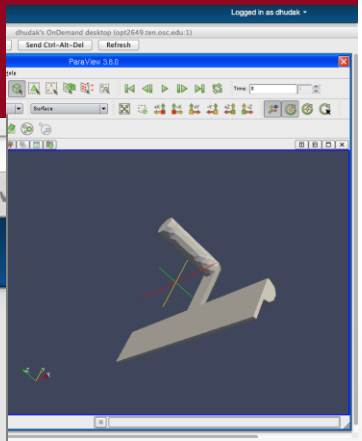
File Transfer & Editing

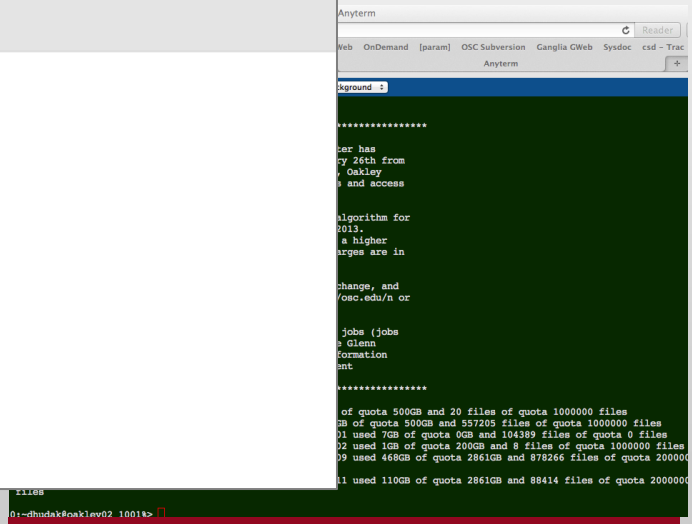
Visualization

Common Catalog







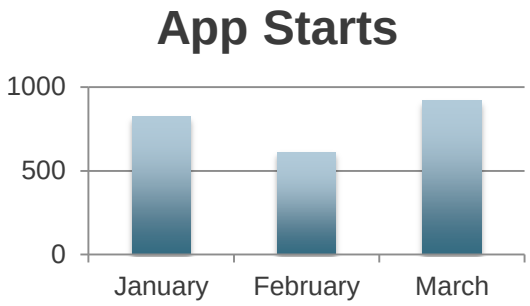


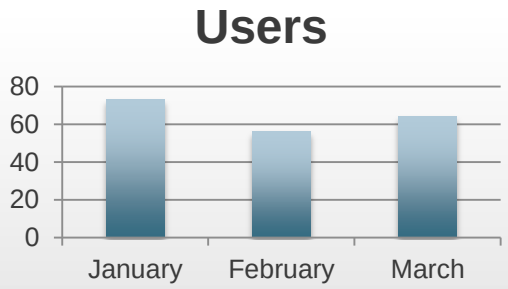
Job Submission & Monitoring

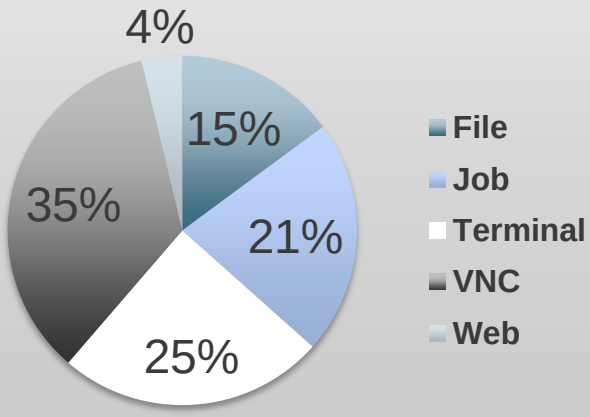
Command Line

OnDemand Update

- In production since January 2013
  - Averaging 65 users and 800 apps per month
- Visualization apps most popular
- Updates planned for Fall
  - App Kit – users can create their own web apps in OnDemand
  - Globus Online integration for large-scale data transfer
  - Visualization improvements
    - Native VNC clients and HTML5 VNC





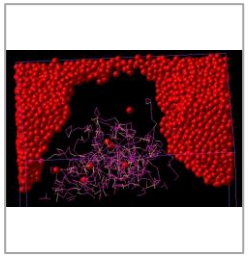


Application Scalability Lab (ASL) Discussion

- Proposal to formalize more in-depth customer support activities such as:
  - Parallelize and port codes to HPC
  - Improve HPC code performance
  - Improve HPC code quality for sustainability
  - Leverage HPC architectural and algorithmic improvements
  - Train scientists and students to become productive HPC developers
- Four focus areas: technologies, tools, techniques, training

ASL Pilot: Center for Advanced Polymer Processing – Dissipative Particle Dynamics for Polymer Modeling

ORIGINAL STATUS



Exclusion Zone Polymer Simulation

Desktop-Only Approach

- *Exclusion zones form at solid-liquid interfaces. Applications include drug discovery, cosmetics and lubricants*
- *Simulations of polymer chains limited in complexity due to lengthy execution times*

OPPORTUNITIES

Opportunities

- Vector computing – leveraging vector capabilities in modern multiprocessors can speed execution up to 4x.
- Multicore computing – modern multiprocessors can speed execution up to 8x.
- Accelerated computing – Xeon Phi acceleration
- Cluster computing –
- Improved code management – increasing sustainability and transferability of code

Description

- The Center for Advanced Polymer Processing (CAPP) is a state-of-the-art center for advanced polymer blending and compounding and reactive research and development in support of the polymer, pharmaceutical and food industries.
- Dissipative Particle Dynamics (DPD) applies molecular dynamics modeling to mesoscale phenomena
- DPD code had been developed by single author at CAPP for 24 months
  - 25 files, ~7K lines of code

Technical Approach

- Multilevel optimization approach
  - Fine-grain data parallelism through vectorization
  - Shared-memory parallelism through OpenMP
  - Distributed-memory parallelism through GA
- Code management and refactoring for sustainability
  - Source control and regression tests

Deliverables

- **Month 1 –** Performance analysis of initial code.
- **Month 3 –** OpenMP parallelization. Source control.
- **Month 5 –** Xeon Phi port. Global Arrays parallelization. Regression tests and development procedures in place.

ASL ACHIEVEMENTS

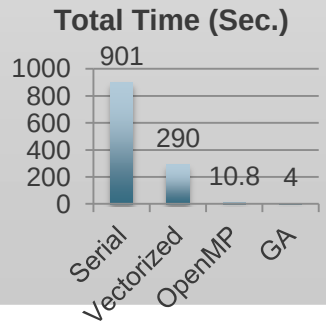
Achievements

- Quantification of HPC benefit in DPD simulations of interest to CAPP partners.
- Demonstration of desktop-only speedup of 8
- Demonstration of Xeon Phi utility for DPD
- Demonstration of cluster computing solution for extreme scale problems.

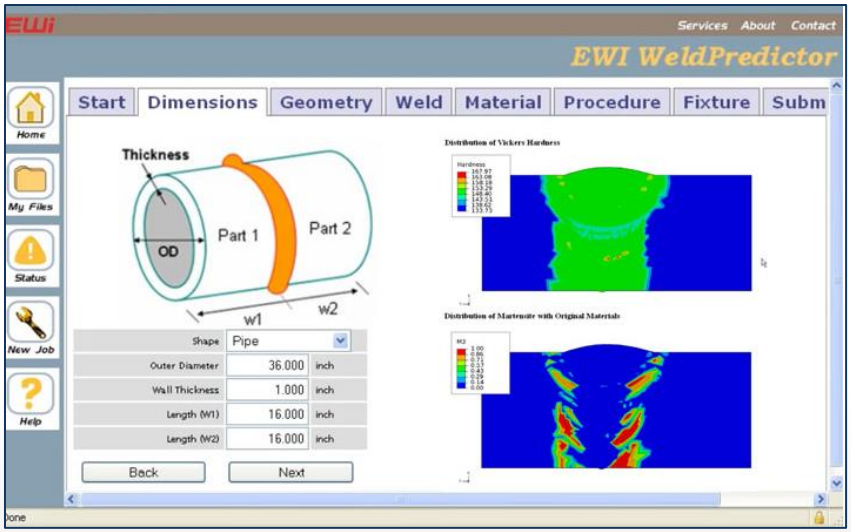
SCIENTIFC IMPACT

Scientific Impact

- *Optimized code returned to science team*
- *New experiments starting with optimized code*



Case Western Reserve University · The Ohio State University · intel



OSC and EWI partnered to create an HPC portal for welding solutions.

Dave Hudak, Program Director for HPC Engineering

dhudak@osc.edu

Research Update

25 years of innovation

OH·TECH | Ohio Technology Consortium
A Division of the Ohio Board of Regents

OSC Proposals Pending

- National Science Foundation
  - 7 proposals
- Ohio Third Frontier Innovation Platform Program
  - 2 proposals
- Department of Health and Human Services
  - 1 proposal
- Department of Transportation
  - 1 proposal

OSC Proposals Awarded
as of 01/07/13

Funding Opportunity	OSC Award Amount
Air Force Research Lab Assistive Technologies Research Center (ATRC) – additional funds **“Public ATR Wiki and Code Repository Proposal”**	$35,000
Department of Energy – DE-FOA-0000760 – under TotalSim **“Web Based CFD Vertical Applications using Cloud Based HPC”**	$35,000

Blue Waters Allocations

- OSC facilitated two Blue Waters awards through the Great Lakes Consortium for Petascale Computation
- Gil Bohrer and Ethan Kubatko, Ohio State University; Brian Guilfoos, OSC
  - Scaling the effects of intermediate disturbance and changes to small-scale ecosystem structure on ecosystem, hydrology, lake and weather interactions to the scale of the Great Lakes region
- Karen Tomko, OSC, and DK Panda, Ohio State University
  - Re-designing communication and work distribution in scientific applications for extreme-scale heterogeneous systems

About Blue Waters
Located at NCSA,
it is a Cray XE/XK hybrid

- AMD 6276 "Interlagos" processors
- NVIDIA GK110 "Kepler" accelerators
- Cray's Gemini torus interconnect

XSEDE Activities

- XSEDE
  - Extreme Science and Engineering Discovery Environment, funded by the National Science Foundation
- XSEDE Student Engagement Summer Projects
  - Funds student summer support and travel to XSEDE'13 in San Diego to present results
  - Performance Modeling of GPU-based High Energy Physics Analysis Software (Dr. Tomko)
  - Hybrid Parallel Application Development (Dr. Hudak)

Condo-of-Condos Program

- Collaborative effort to integrate networking, database, and HPC related activities to improve research productivity
- 11 institutions, led by Clemson University
  - Requirements: Science DMZ, 100-Gig network, local HPC and storage
- Proposal to NSF to be submitted soon
- Would fund 1-2 FTE specialists at OSC to assist with large-scale data projects and HPC analytics

NSF EarthCube Solicitation

- Developing a Community-Driven Data and Knowledge Environment for the Geosciences (NSF-13529)
- $2 million award
- Integrates OSU Arctic System Reanalysis (ASR/Bromwich) OSC iRODS data collection with EarthCube Data Interoperability Building Blocks initiative
- In addition to ASR, other users and applications in Ohio will benefit for information/data sharing
- Multi-institutional partnership led by RENCI

Summer Research Interns

- Funded by NSF, in conjunction with Wittenberg University
- Two undergraduate students on-site at OSC for summer, working with researchers
- Investigating Options for a More Portable GooFit Package
  - Cole Taylor, working with Dr. Tomko
- Multilevel Parallel Programming Best Practices: Examples and Tutorial
  - Eric Mann, working with Dr. Hudak

LAMP Project

- Lightweight Automotive Materials Program
- A partnership of technology innovators:
  - NCMS
  - TotalSim
  - SimaFore
  - Nimbis
- Goal: Establish successful development and validation of cost-effective, high-strength materials technologies that could significantly reduce vehicle weight without compromising cost, performance, safety, or recyclability
- Funding: U.S. Department of Energy

Industrial Portal Development

- National Digital Engineering and Manufacturing Consortium (NDEMC)
  - Three pilot portals constructed, field trials concluded
  - Welding portal in progress with General Electric
  - OSC pursuing extension for additional projects (Q3 2013)
- TotalSim – Aerodynamic analysis
  - Simulation of cooling fans for radiators
  - Project kickoff beginning this month
  - Six month project

OSC Executive Director Charlie Bender in front of the Cray X-MP

Doug Johnson, Senior Systems Engineer

Supercomputing Update

25 years of innovation

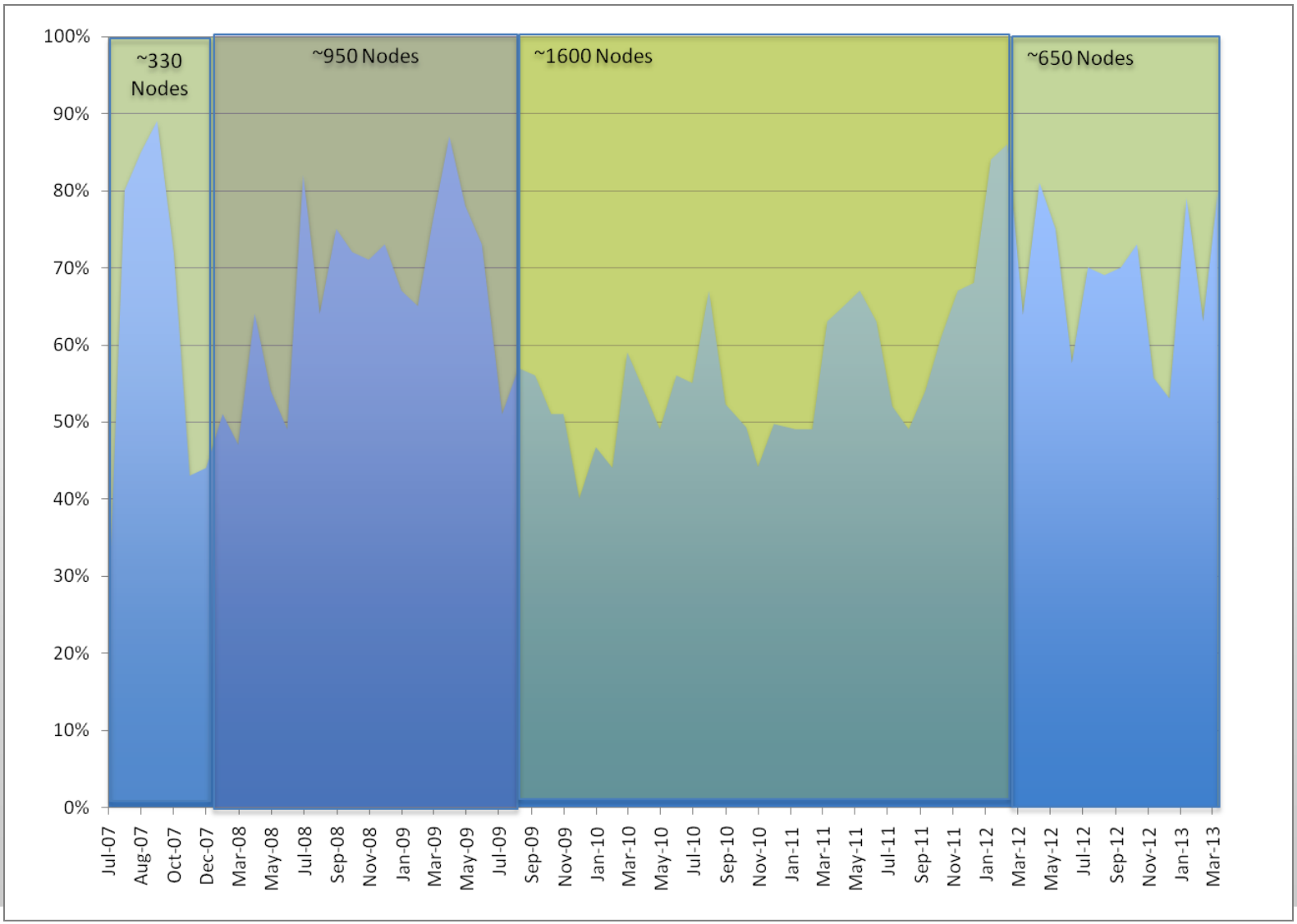
Outline

- System utilization
- Software utilization
- Storage utilization
- Operations activities in February / March
- Upcoming

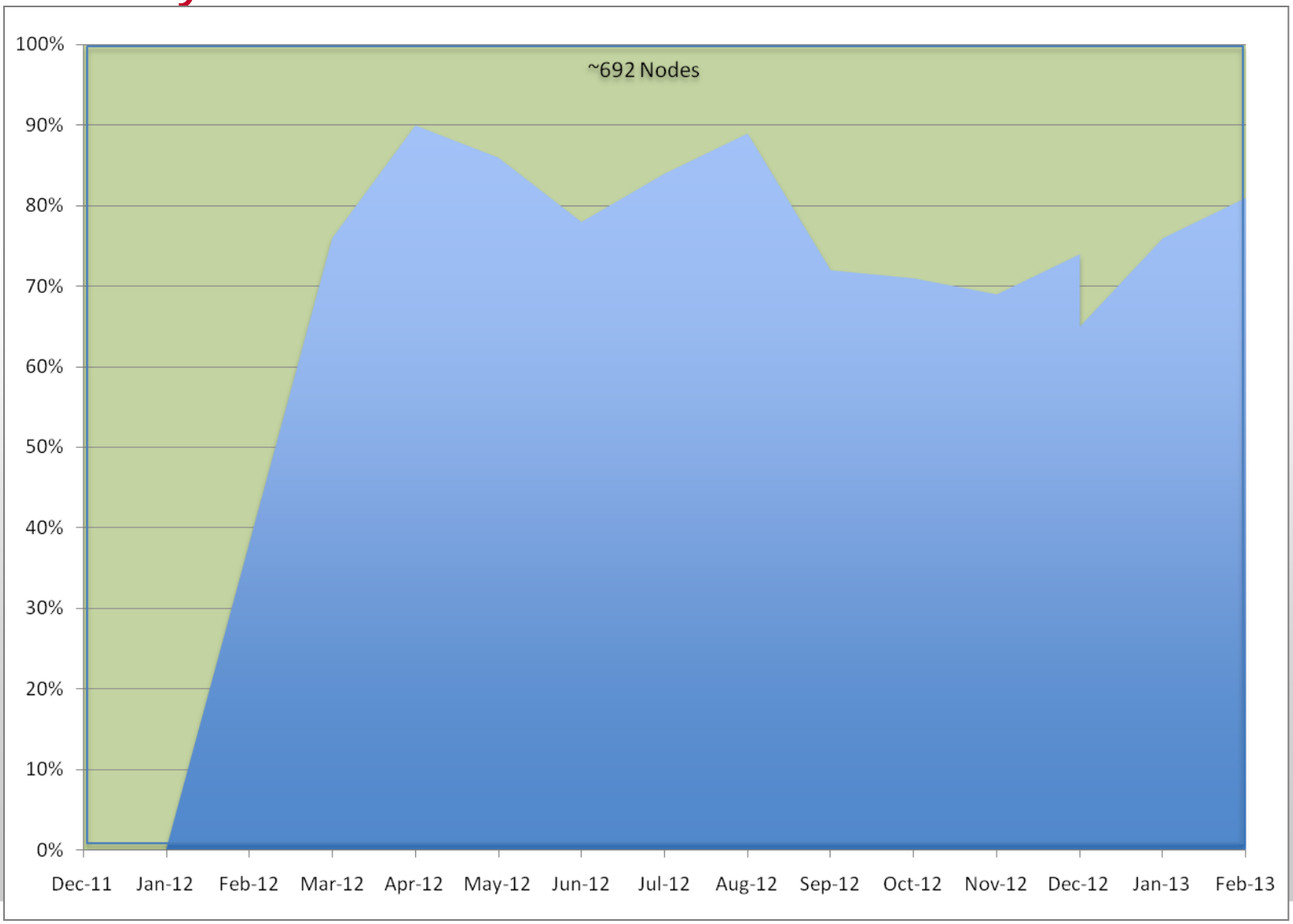
System utilization summary, February / March

System	Job count	CPU hours	Utilization	Users	Groups
Glenn	196,314	5,319,590	72%	336	177
Oakley	148,118	9,257,500	79%	317	160

Glenn Lifetime Utilization



Oakley Lifetime Utilization



Glenn Utilization by Institution (Feb, March)

Institution	Job count	CPU hours	Users	Groups
OSU	150,564	3,931,387	168	90
University of Akron	1,197	518,203.1	7	3
Univ. of Cincinnati	5,401	193,300.3	32	15
Bowling Green	4,238	191,056	22	9
Case Western	1,489	15,2011.2	3	2
Wright State	2,449	89,560.14	6	3
Univ. of Toledo	3,325	72,950.96	12	8
Ohio Univ.	2,448	61,648.19	10	8
Cleveland State	684	33,924.13	3	2
Youngstown State	231	24,805.67	2	2
Commercial	31	17,154.95	2	2
Children's Hospital Research	2,570	11,385.47	3	2
Kent State Univ.	300	98,68.147	4	4
OSC	834	5,805.612	34	13
Wooster	131	5,478.906	9	2

Oakley Utilization by Institution (Feb, March)

Institution	Job Count	CPU hours	Users	Groups
OSU	100,488	7,039,776	177	90
Commercial	1,374	1,494,139	10	5
Kent State Univ.	26,737	147,813.2	13	6
NDEMC	399	106,860.8	11	8
University of Akron	478	105,864.8	4	4
Ohio University	169	104,357.2	2	2
OSC	1,280	62,937.77	54	15
Miami Univ. of Ohio	11	49,169.11	2	2
Case Western	638	48,583.35	6	5
Univ. Cincinnati	1,018	25,265.24	16	8
Univ. of Toledo	623	21,233.68	4	2
Central State	177	19,661.15	2	2
Children's Hospital Research	13,653	15,936.87	1	1

Software Utilization

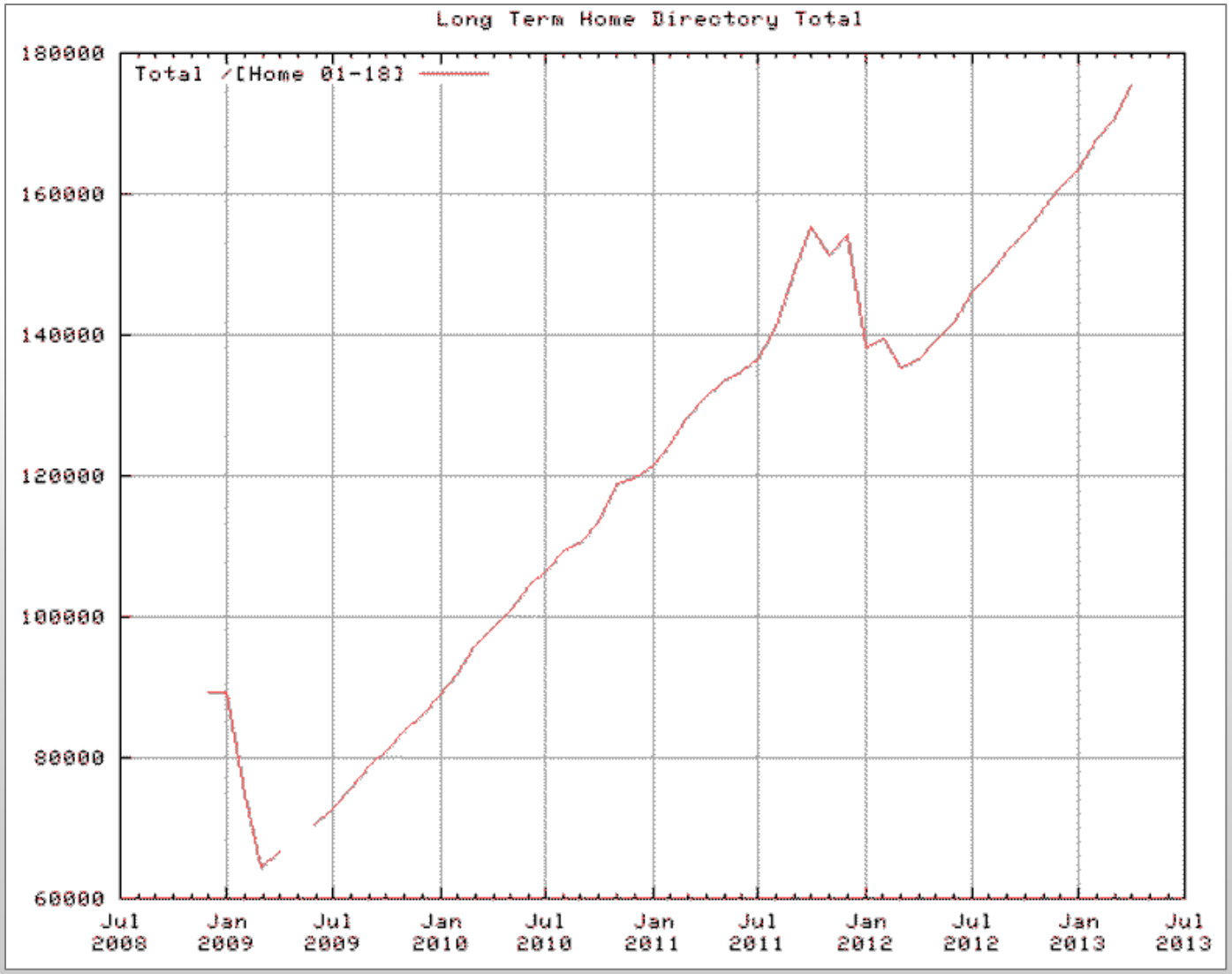
Glenn

Package	Jobcount	CPU hours	Users	Groups
a_out	1292	1755612	18	17
gaussian	4772	292383.8	74	36
vasp	2529	262908.2	18	9
lammps	2703	250456.5	5	3
adf	701	228802.5	5	5
matlab	26127	226145.6	25	19
qchem	15088	217592.1	9	3
gromacs	24828	209340.6	7	5
namd	286	166094.6	4	2
molcas	3031	137411.6	10	4
scalapack	265	133478.7	10	4
AliEn	21956	127350.3	1	1
charmm	155	125131.4	1	1
fluent	475	116471.7	23	14
ansys	381	110733.2	27	16
amber	6036	102410.3	11	8
cfl3d	132	84615.99	2	1
turbomole	291	45532.62	3	3
ccsm	23	41236.94	1	1
abaqus	811	41138.97	20	16

Oakley

Package	Jobcount	CPU Hours	Users	Groups
vasp	11427	1608536	28	6
wrf	11651	1505930	3	3
scalapack	11225	1361786	24	4
qchem	41720	1100384	16	6
OpenFOAM	749	911772.1	11	7
gaussian	2565	494991.4	22	14
a_out	1314	450929.8	32	15
namd	624	412118.5	2	2
amber	5026	407071.9	8	5
cpmd	620	361268.9	3	3
lammps	531	321178.2	5	3
gromacs	2083	141132.9	6	5
matlab	10586	89903.19	21	16
fluent	247	72106.61	10	7
cuda	1010	68317.77	33	21
lmf	283	47318.23	1	1
dlpoly	51	27660.85	2	1
turbomole	111	22057.47	2	2
abaqus	244	15239.23	11	9
nwchem	619	13696.77	2	1

Home Directory Usage Trends (GB)



Project and GPFS Storage Utilization Summary

File systems	Total usable	Used	Free	Files
Home	~290 TB	~182 TB	~108 TB	~135M
Project	~630 TB	~440 TB	~190 TB	~81M
GPFS	~400 TB	~100 TB	~300 TB	~17M

Tape Library Utilization

Tape type	Total tapes	Used tapes‡	Free tapes	Free capacity*
LTO-3	634	499	135	~80TB
LTO-4	2100	1369	731	~860TB

‡Fragmented tape use increases used tapes count, planning merge.

*Assuming 1:1.5 compression ratio.

Tape library slots	Used slots	Free slots	Potential free capacity†	TSM reported used capacity
3238	2734	~500	~2.2PB	1.14PB

†Assuming LTO-4 tape media is added, single copy, and all tapes used, 1:1.5 compression ratio, and a tape merge to reclaim tapes.

Operations Activities in February / March

- Center downtime February 26
  - Oakley unavailable until February 27
  - Migration to new 10 Gb Ethernet switches
  - Database and user changes for the OnDemand2 services
  - Migrate OnDemand2 services to new server
  - Various maintenance
    - DDN3 firmware, Shibboleth and other software upgrades, scheduling policy change on Oakley, charging changes
- Yearly allocations
  - First step to one account per user
- Installed 9 node test cluster for Intel Xeon Phi

Upcoming

- Beta test of IBM LTFS EE software, and LTO5 donated tape drives
- OSC software infrastructure improvements
  - SSO and Grid services
- GPU usage / management improvements
- GPFS server replacement
  - Migration of project file systems to GPFS
  - Anticipated capital purchase approval in May, deployment late Summer
- Active File Management (AFM), formerly Panache
- + GPFS WAN extensions, local writable cache of a subset of the OSC file system.

Upcoming (cont.)

- Merge project and current GPFS storage
  - Approximately 1.1PB file system (~500TB free if we migrated today.)
  - DDN2 and DDN3 storage arrays
- 8 GPFS Network Shared Disk (NSD) and NFS servers
  - Intel Xeon Processor E5-2620 processors
  - 128GB memory
  - 4 QDR Infiniband ports
  - 2 10GbE ports
  - 2 8Gb Fibre-Channel ports (NSD nodes)
  - Replaces 26 servers, but increased performance
- New storage array for metadata
  - Support for several billion files

Upcoming (cont.)

- HIPAA data support at OSC
- Deploy ‘Ruby’ research cluster for MIC work
  - 8 HP SL250 nodes
    - Dual Intel Xeon E5 2670 (Sandy Bridge) 16 cores total
    - 128 GB RAM
    - 1 TB HDD
    - 200 GB SSD node
    - Intel Xeon Phi 5110p card
  - FDR Infiniband (56 Gbps)
  - Clone and diverge Oakley root file system (test of configuration management software)

*Ruby Dee is an actress, poet, playwright, screenwriter, journalist and activist. She was born in Cleveland.

Upcoming (cont.)

- nVidia K20X (Kepler) GPUs
  - nVidia provided two evaluation cards (thank you, nVidia!)
  - To be deployed on Ruby
- Home directory file system and server replacement
  - Determine criteria (performance, capacity, etc.)
  - RFP in mid 2013
  - Migrate in late 2013, early 2014.

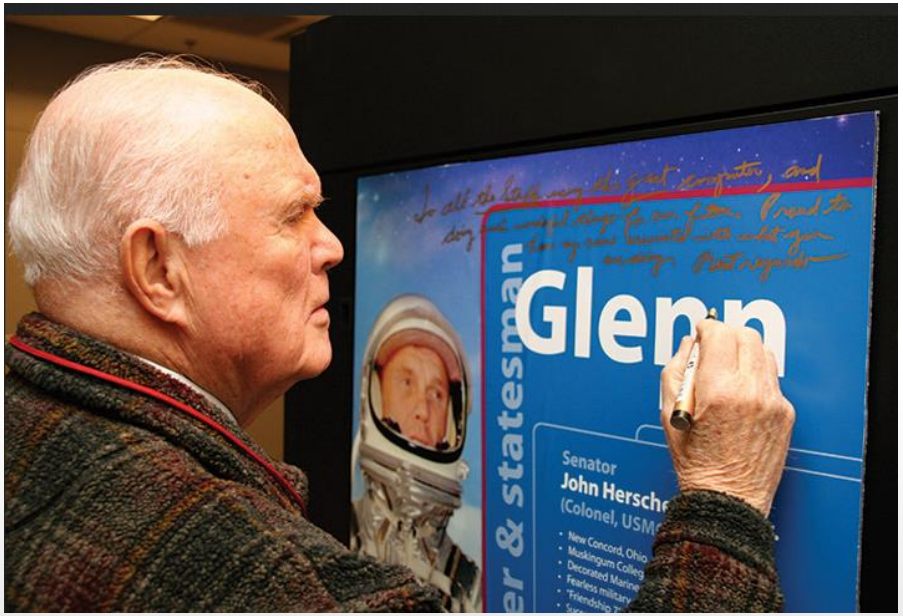
Upcoming (cont.)

- Cost recovery calculations
  - Cost recovery recalculated yearly
- Condo model
  - Allow OSC academic users to expand GPFS storage, compute resources

Dr. Greg Wiet demonstrates the Virtual Temporal Bone simulator.

Aravind Asthagiri, Chair
The Ohio State University

SUG Business



Sen. John Glenn signs a poster on the Glenn Cluster.

Rick Prairie, University of Cinncinati

SUG Software Committee Report

Software Updates

- Xfdtd
  - Updated to version 7.3.1.2
- MATLAB
  - Updated to version R2013a

Renewals – Calendar Year 2013

Software	Expiration (2013)	License Term (years)	Projected Cost	Renewal Status/Started
MATLAB Distributed Computing Server	March 1	1	$3,750	Completed
CSD	April 1	1	$1,500	Completed
COMSOL	June 15	1	$3,695	No
OSU MATLAB	Sept. 30	1	$18,218	No
LS-Dyna	Dec. 27	1	$500	No
Gaussian	Dec. 31	1	$12,000	No

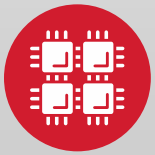
John Heimaster led efforts to improve BITNET connections.

John Heimaster, The Ohio State University

SUG Hardware Committee Report

Questions?

1224 Kinnear Road
Columbus, OH 43212
OSCHelp: 1.800.686-6472



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