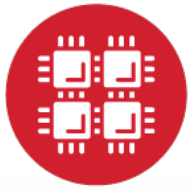


Ohio Supercomputer Center

An OH·TECH Consortium Member

OSC Fall 2016: New Services at OSC!

David Hudak
Basil Gohar
Karen Tomko

October 2016 SUG General Meeting

General Agenda

- OSC Impact for 2015
- OnDemand 3 / OpenOnDemand updates and demo
- Compute and Storage service upgrades
- Getting the best performance out of Owens
- National Landscape

Production Capacity CY2015

161M+
core hours consumed

4M+
computational jobs

842 TB
data stored

99.7% up-time
(target: 96%)

Client Services CY2015

25 Ohio-based universities

33 companies

10 training opportunities

451 awards made

1,267 clients

124 trainees

459 projects served

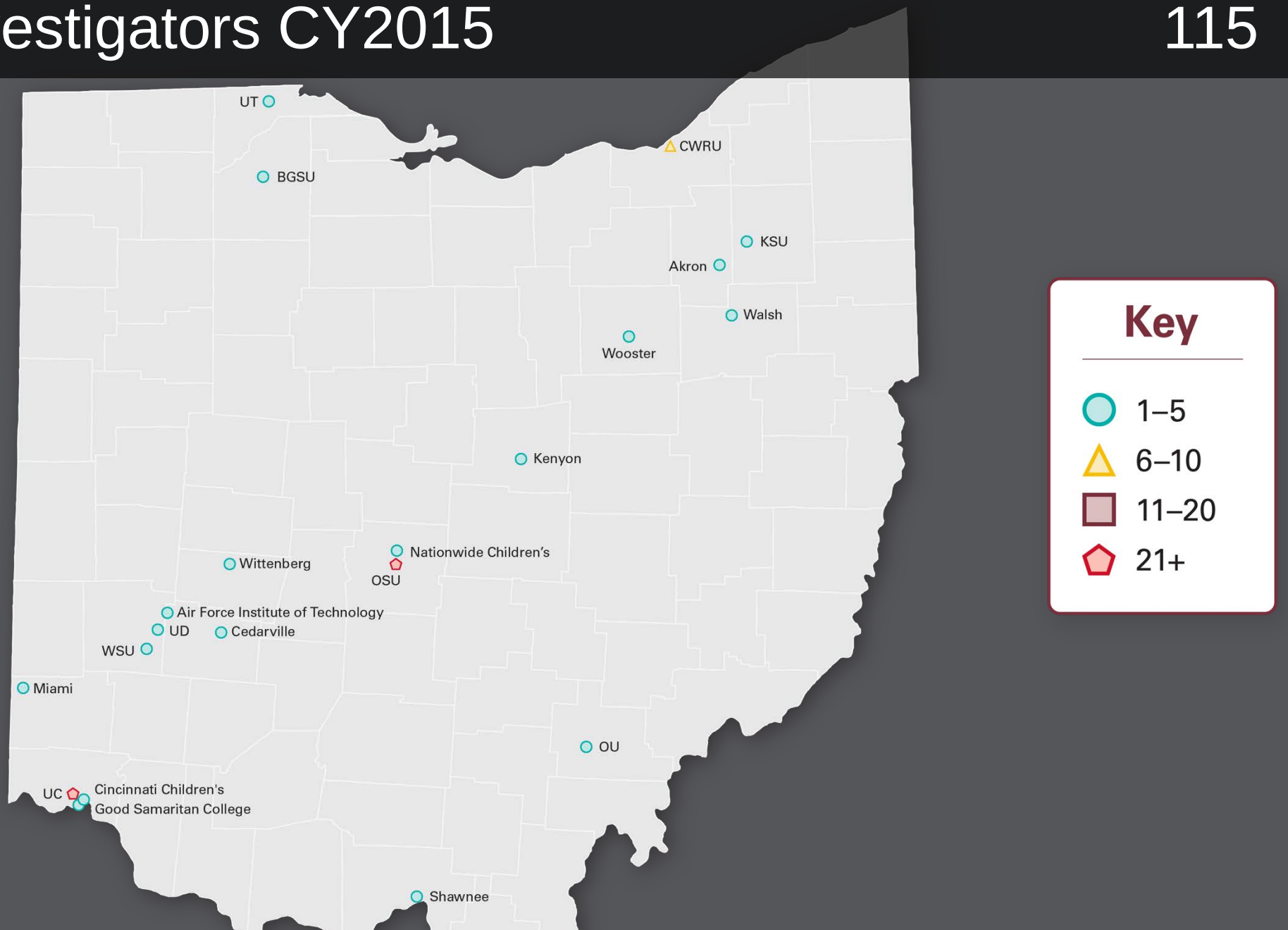
19 academic courses used OSC's supercomputers

Active Projects CY2015

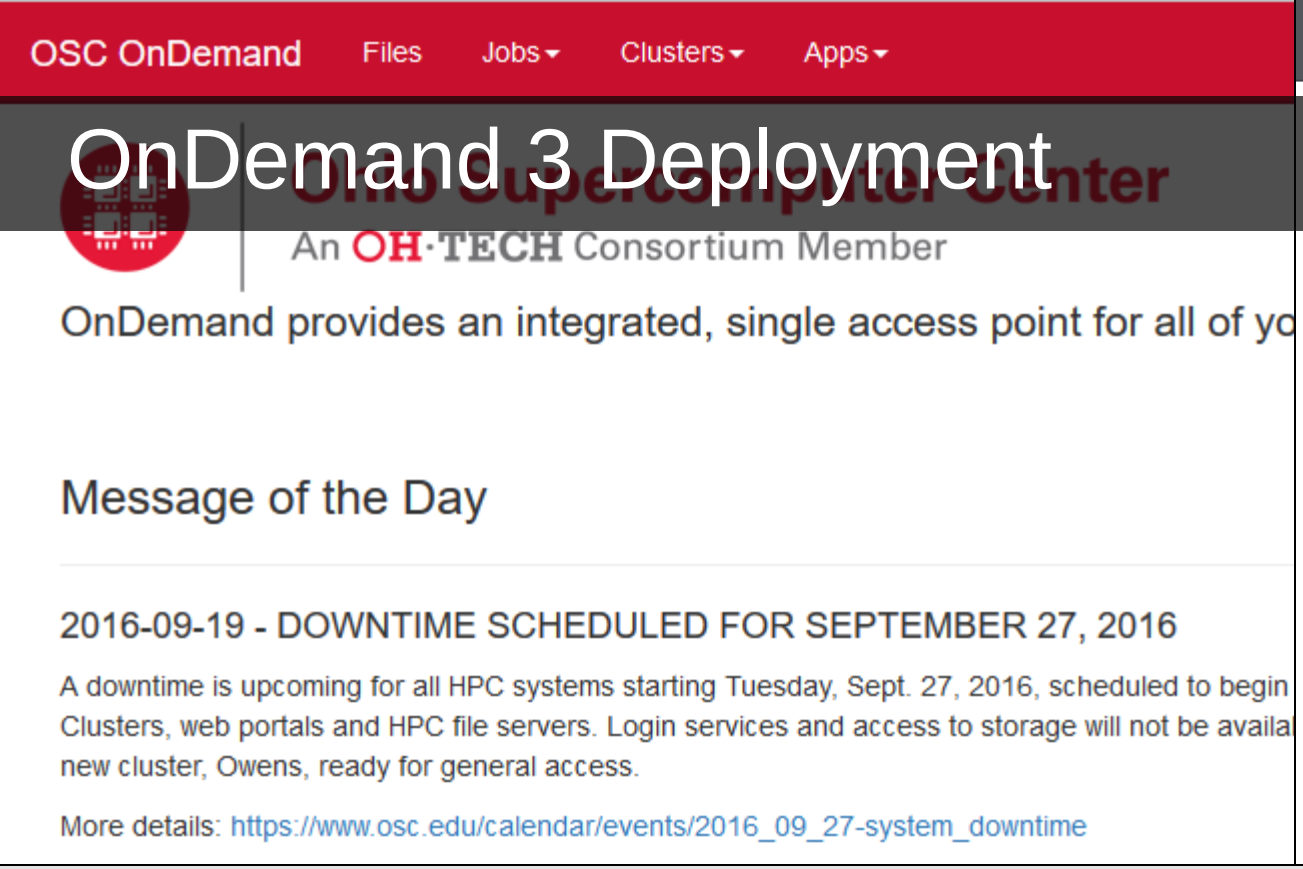
459

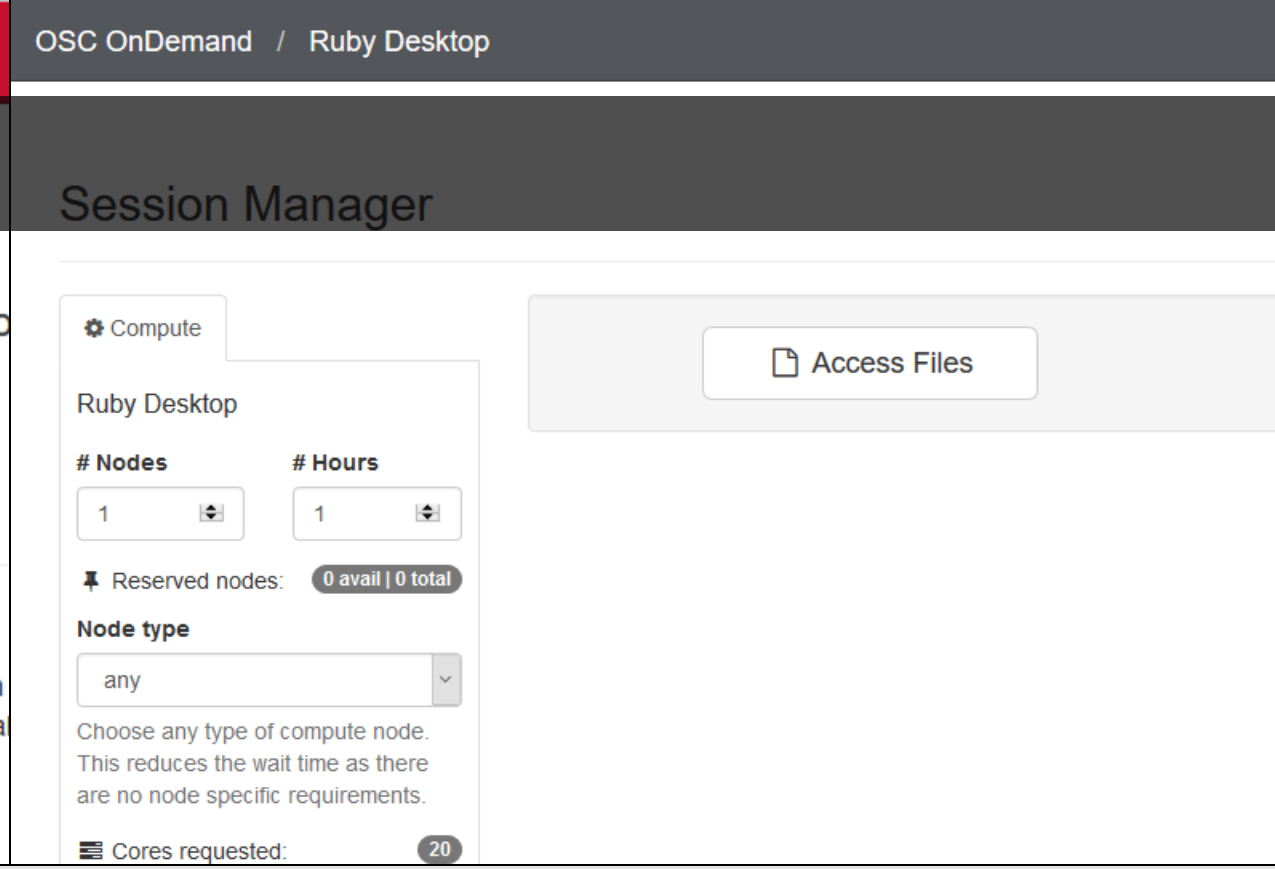
New Project Investigators CY2015

115



OnDemand 3 Deployment





- Provides “one-stop shop” for access to HPC services
- Based on NSF-funded Open OnDemand project
- New features include:
  - Faster file browser, system status and job apps
  - Remote graphical desktops
  - Federated authentication
  - Ability to create and share apps

OSC Supercomputers + Storage


	Owens (2016)	Ruby (2014)	Oakley (2012)
Theoretical Performance (TF)	~750	~144	~154
# Nodes	824	240	692
# CPU Cores	23,392	4,800	8,304
Total Memory (TB)	~120	~15.3	~33.4
Memory per Core (GB)	4.5	3.2	4
Interconnect Fabric (IB)	EDR	FDR/EN	QDR

	Capacity (PB)	Bandwidth (GB/s)
Home Storage	0.8	10
Project Storage	3.4	40
Scratch Storage	1.1	100
Tape Library (backup & archive)	5+	3.5

Owens: Migrating Your Jobs

https://www.osc.edu/owensmigrate

Dense compute nodes (648 + 160 GPU-ready) have

- 28 cores, 125 GB available memory (4.46 GB/core)
- Partial node jobs get 4 GB per core by default

Huge memory nodes (16) have

- 48 cores, 1510 GB available memory (31.4 GB/core), 20TB of local scratch space
- No partial node jobs at this time

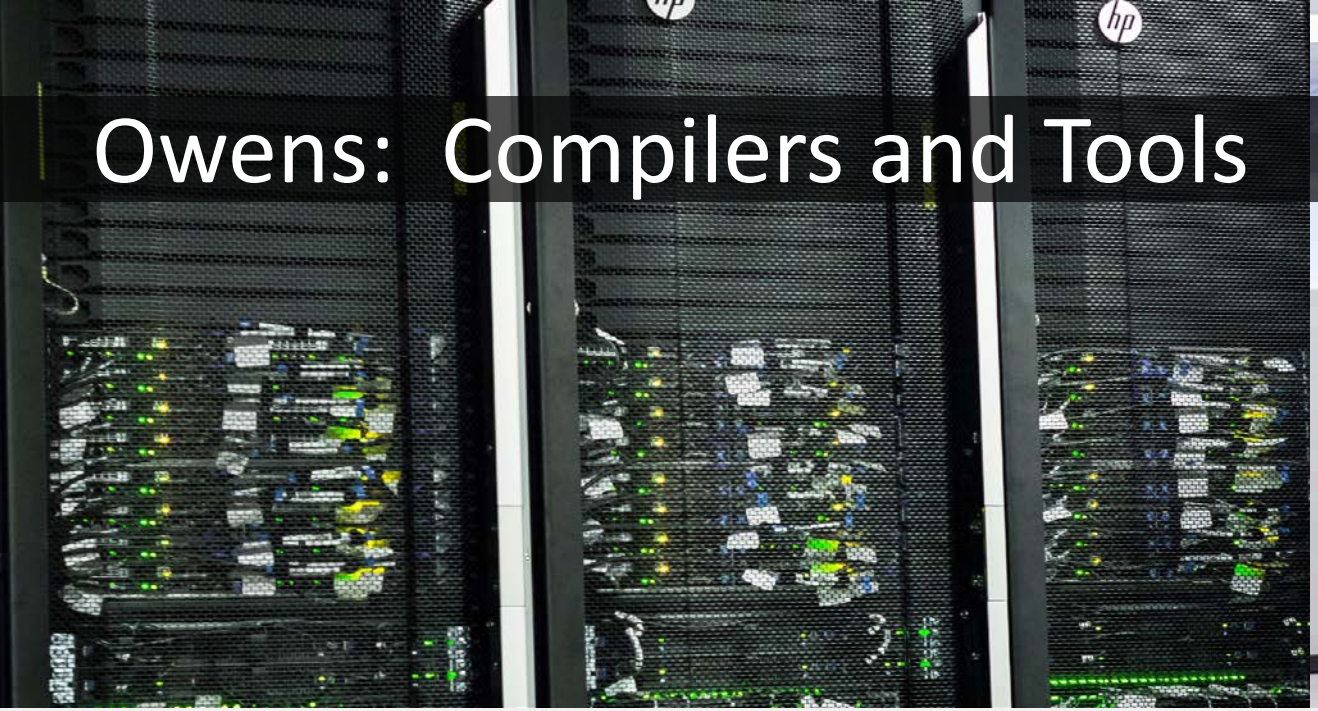
Debug queue

- Request “-q debug”

Job output/error logs

- written directly to working directory
- No need for qpeek

Owens: Compilers and Tools



Operating System

- Red Hat Enterprise Linux (RHEL) 7.2

Compilers

- Intel 16.0.3, gnu 4.8.5, PGI coming soon
- Flags for advanced vector instructions
  - icc/ifort -xHost or gcc/gfortran -march=native
- **https://www.osc.edu/owenscompile**

MPI

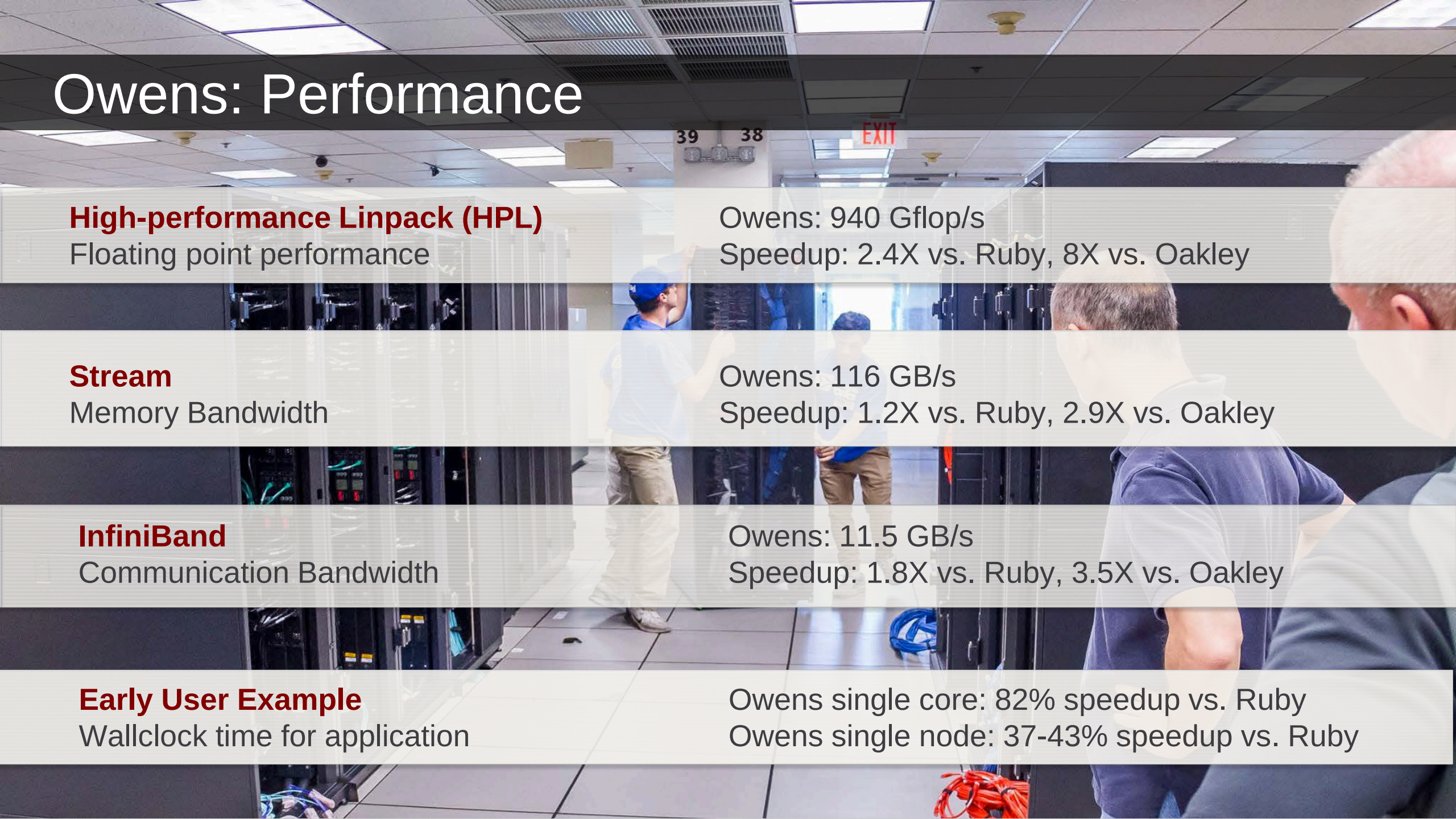
- mvapich2 2.2, IntelMPI 5.1.3, OpenMPI 1.10 & 2.0

Debug and performance tools

- Totalview debugger
- Allinea MAP and perf-report
- Intel VTune and Intel Advisor
- See relevant OSC software pages for more information

Same module system as on Oakley and Ruby

Owens: Performance



High-performance Linpack (HPL)
Floating point performance

Owens: 940 Gflop/s
Speedup: 2.4X vs. Ruby, 8X vs. Oakley

Stream
Memory Bandwidth

Owens: 116 GB/s
Speedup: 1.2X vs. Ruby, 2.9X vs. Oakley

InfiniBand
Communication Bandwidth

Owens: 11.5 GB/s
Speedup: 1.8X vs. Ruby, 3.5X vs. Oakley

Early User Example
Wallclock time for application

Owens single core: 82% speedup vs. Ruby
Owens single node: 37-43% speedup vs. Ruby

National Landscape: Research/Scientific Computing

- XSEDE 2.0 - Open letter from John Towns, https://www.xsede.org/web/guest/towns-xsede2
- The Campus Research Computing (CaRC) Consortium, 28 institutions including OSC, sharing technology, expertise and best practices
- NSF ACI: report “Future Directions for NSF Advanced Computing Infrastructure to Support U.S. Science in 2017-2020” National Academies
- The National Strategic Computing Initiative (NSCI), OSTP
- For more on NSCI and the NSF ACI see the CASC website http://casc.org/meetings-presentations/