



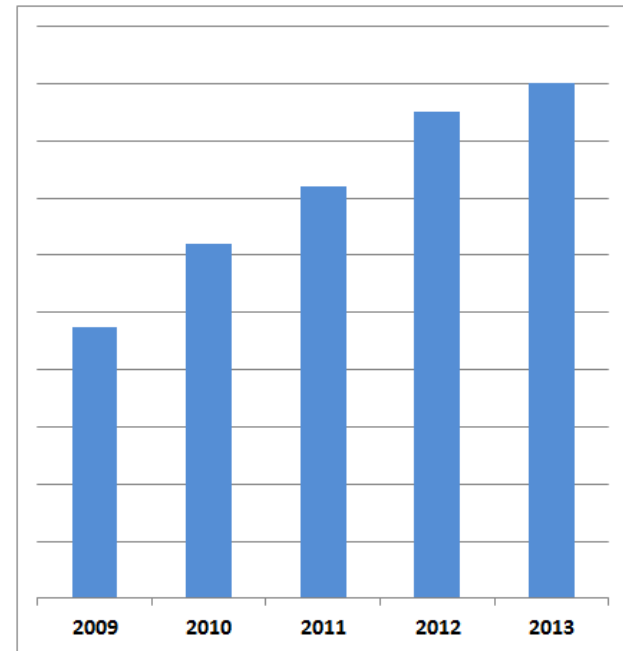
# Panasas Update

APRIL 7, 2014

**PANASAS PRODUCT MARKETING**

- **Scale-out NAS Solutions for Enterprise and Research**
  - ActiveStor® appliances in 5th generation
  - Shipping Since 2004
- **Panasas Management**
  - Storage-experienced executive team
  - Dr. Garth Gibson, Founder & Chief Scientist, Author of “Berkeley RAID Paper”
- **VC Funded**
  - Samsung Ventures, Intel Capital, Mohr Davidow, Carlyle Group, Centennial

Active Customer Count



## Industry Recognition



Cloud Project of the Year



Faye Pairman,  
Panasas CEO



Public Sector Storage Project of the Year



- **Leading Performance, Fully Parallel**
  - Bladed design allows capacity and performance to scale linearly to 8PB and 150GB/s
  - No in-band filer heads or hardware RAID controllers to constrain performance
- **Easy to Deploy, Use, and Manage**
  - Tightly integrated system
  - Set up or grow capacity in under ten minutes
  - Single, global namespace
- **High Reliability and Availability**
  - Per-file distributed RAID with vertical parity and parallel RAID reconstruction
  - High redundancy in hardware and software



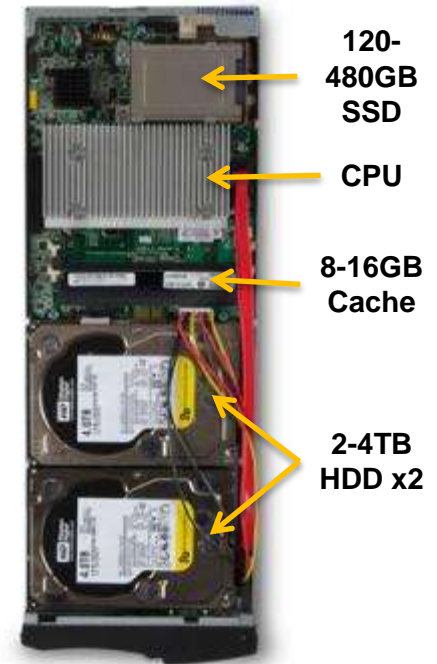
**ActiveStor 14**  
**10 shelves, 830TB**

- **Intelligent, Unified, and Cost Effective**

- Large files stored on high capacity Enterprise SATA hard drives
- Metadata and up to 60KB files stored on SSD
- Up to 8x faster small file performance and directory listings
- Improved file system responsiveness to end users

- **Hybrid Storage Ideal for Mixed Workloads**

- Improves both throughput & IOS performance
- Up to 14,000 random 4KB file read IOPS per shelf



**ActiveStor 14  
Storage Blade**

- **ActiveStor with PanFS 5.5 is the first scale-out NAS solution designed for HPC that delivers enterprise-grade Microsoft® Windows® support**
- **Compatibility with mixed IT environments is important for many technical computing workflows:**
  - Data uploaded from Windows workstation
  - Data analyzed/simulated on Linux compute cluster
  - Results inspected/visualized on Windows workstation
- **Especially important for HPC deployments in**
  - Energy, Finance, Life Sciences, Manufacturing, Media & Entertainment

- **Enterprise Grade Microsoft® Windows® Support**
  - Commercially licensed CIFS protocol
    - SMB 1.0, 2.0, 2.1
  - Comprehensive Windows client support
    - Windows Server 2003, 2008 (including RC2)
    - Windows XP, Vista, Windows 7, Windows 8
  - Improved integration into heterogeneous IT environments
    - High-fidelity Access Control List (ACL) support (including inheritance)
    - Active Directory enhancements: trusted domain support
  - Simplified manageability
    - Single computer account/single domain join
- **Performance Enhancements**
  - Up to 2x faster Windows access
  - Up to 67% faster NFS v3 access
- **New Availability and Security Features**
  - File system availability now at more granular level (per-volume basis)
    - Builds on PanFS 5.0 RAID reconstruction volume priority feature
  - Enhanced DirectFlow security: IP-Based exports control

- **CEMS: Cloud Based Infrastructure to Support Climate and Environmental Data Services**
- **JASMIN “super storage cluster”**
- **JASMIN is now the largest HPC storage deployment in Great Britain, with 15.3 PB of storage**
- **One part-time storage administrator manages**
  - “jasmin1”: ActiveStor 11 (3TB drives), 109 shelves, 7.1PB, installed 2012
  - “jasmin2”: ActiveStor 14 (4TB+SSD drives), 95 shelves, 8.2PB, installed Q1 2014



*“We are especially impressed with how easy ActiveStor is to use and manage. [It] requires minimal staff to maintain so that researchers can concentrate on their simulations—not on cumbersome system administration.”*

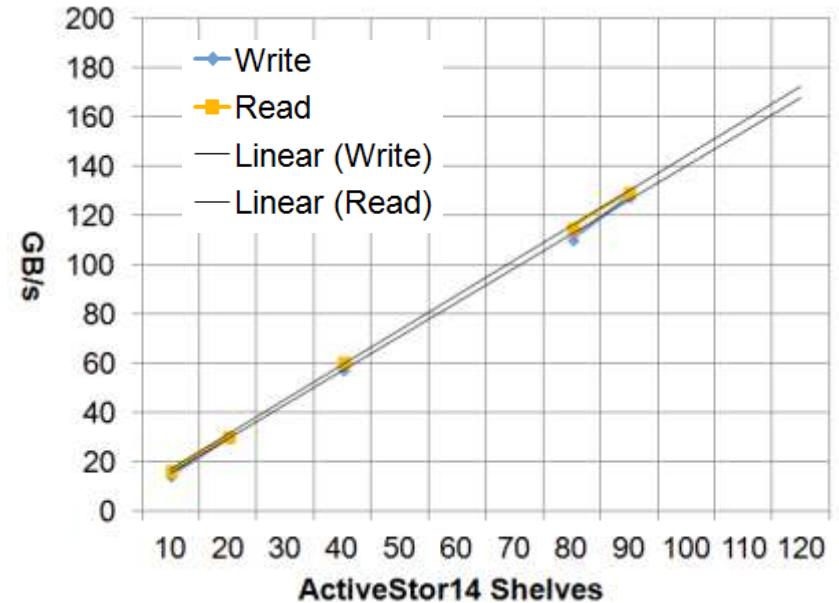
—Dr. Peter Oliver, Scientific Computing Technology Group (e-Science Centre)

## ■ Configuration

- 90 ActiveStor 14 shelves
- 27 director blades.
- 180 compute nodes (3200 processes)

## ■ Linear Scalability as Expected!

- Note: 2 compute nodes/shelf of storage insufficient to drive maximum performance but still compelling!
- 128.6 GB/s write, 128.4 GB/s read
  - 1429MB/s per shelf
  - 1550-1600MB/s possible with additional compute nodes
- 112K creates/s, 353K stats/s, 361K 4KB file random reads/s
  - Could be 4-5x higher with additional directors (not spindle limited in this configuration)





**THANK YOU!**