

### Built to Share and Scale

- All-flash architecture provides consistent <1ms latency and up to 300,000 32K IOPS in 3 rack units
- Replace hundreds of white box nodes with a single FlashArray

### Always On

- Proven >99.9999% delivered availability and nondisruptive operations keep vital cloud services online
- Redundancy, data protection, and BC/DR features built-in
- Native replication and snapshot features supported in OpenStack

### Simple, Automated

- No need to manage tiers, RAID, or encryption. Storage simplicity reduces integration complexity
- Cinder driver, Python Automation Toolkit, and comprehensive REST API simplify storage automation and orchestration

### Economical

- Integration and automation toolkits lower the cost and complexity of OpenStack deployment
- Save time, space, power, and cooling in your data center with purpose-built all-flash storage

### Supported

- The latest release of the open source cloud software, called Ocata, is the most widely



supported open source software for building public and private clouds

# ALL-FLASH STORAGE FOR OPENSTACK

## Pure Storage Delivers Performance, Simplicity and Advanced Storage Features for Open Cloud Environments

Your OpenStack deployment will help you capture the value of cloud services, but traditional block storage solutions can limit OpenStack benefits. White box storage nodes are costly to maintain, slow, and extremely complex. Purpose-built storage arrays, even those using flash, can be expensive, difficult to scale, and disrupt cloud services during upgrades and maintenance.



### FAST

Pure Storage provides exceptional performance for Cinder and leverages OpenStack tools to accelerate functions like instance creation.



### SIMPLE

Pure Storage provides the simplest storage for OpenStack – easy to deploy, easy to use, easy to maintain and scale.



### EFFICIENT

Replace hundreds of white box nodes with a single highly-available FlashArray//m.

## PURE STORAGE: ALL-FLASH PERFORMANCE FOR OPENSTACK CLOUDS

All-flash storage from Pure increases storage efficiency, simplifies OpenStack deployments, and shortens integration times to improve the ROI of cloud service deployments. A single 3U FlashArray//m can replace up to 160U of white box storage nodes, saving space, money, and IT management effort. Advanced storage features like replication protect your service offerings. Easy to integrate into an OpenStack environment, FlashArray provides the scalability, reliability, simplicity, low cost, and non-disruptive operations required to make your cloud successful.

## DEPLOY OPENSTACK FASTER WITH PURE STORAGE



### PURE STORAGE CINDER DRIVER

- **Complete Cinder functionality**
- Contributed integration makes Cinder deployment faster
- Create and delete volumes, attach and detach to hosts, create and delete snapshots
- Fully documented and supported, included in core OpenStack (Juno and beyond)



### PYTHON AUTOMATION TOOLKIT

- **For custom OpenStack implementation.** Leveraging the Python Automation Toolkit provides access to vital storage features
- Automated snapshot policies, replication, capacity management and monitoring
- Improved monitoring and control tools
- Available at no cost to all Pure customers

### COMPREHENSIVE REST API

- **For full customization** and access to 100% of FlashArray's advanced storage features
- Comprehensive, fully documented RESTful API
- Accelerates customized integration for a range of management and orchestration suites
- Included at no cost with every FlashArray

RESTful API  
GET PUT POST DELETE

# PURE'S INVESTMENT IN OPENSTACK

- Corporate Sponsor of OpenStack Foundation since 2014
- First Cinder driver in Folsom (2012 H2)
- Full in-tree Cinder driver since Juno (2014 H2)
- Python SDK library (2014 H2)
- Active contributor to core projects
- Core Cinder team member
- Dedicated Solution Architect
- Sponsorship of OpenStack Summits and Days

## OPENSTACK CONTRIBUTIONS

- Over 200 code-set commits
- Over 48,000 lines of code (18,500 in Cinder)
- Top 10 Contributor to Cinder (Mitaka)
- Top 10 Cinder CI voter (all releases)
- Code to over 16 projects
- Core Cinder team member
- High-Level Architectural Contributions

## OPENSTACK INTEGRATION: OPERATIONAL SIMPLICITY

- Multi-backend support; multi-protocol support
- No cloud admin access or training required for Pure GUI
- 'Zero Touch' Implementation – minimum of 3 lines in OpenStack configurations
- All OpenStack Cinder features fully integrated through Horizon GUI and OpenStack CLI
- Cinder scheduler load balances on capacity and performance metrics provided by the arrays
- Full Integration with Consistency Groups and Generic Volume Groups
- Full support for Cinder (Cheesecake) Replication, including multi-target
- Simple Cinder configuration
- Best Practices available for different OpenStack releases

## NON-CINDER WORK COMPLETED AND UNDER-DEVELOPMENT

- **Nova:** Fix multipath bugs, TRIM/UNMAP support, enhanced KVM IO QoS
- **Trove:** Working with Stratoscale to optimize Cinder utilization (snapshots and replication)
- **Glance:** Image Cache
- **OS-Brick:** Core contributions
- **Horizon:** Pure Storage plugin
- **Manila, Swift:** FlashBlade driver

## PURE AND OPENSTACK VALUE ADDITIONAL VALUE ADDS

- Standard OpenStack Cinder deployment
- 'Zero-touch Implementation'
- Multi-protocol drivers
- Full snapshot and consistency group support
- Cinder Replication support
- Supports OpenStack's Quality of Service
- Great implementation of Glance Image-Cache for Cinder (significant instance creation time improvements)

## OPENSTACK DEPLOYMENTS SUPPORT

- In-tree since OpenStack Juno release
- Pass all Tempest/Grenade tests
- Leader in 3rd Party CI Project
- Supplied by ALL OpenStack Deployments and Platforms

## COMPREHENSIVE FEATURE SUPPORT NEW FEATURES

- Pure Storage Fibre Channel driver to complement iSCSI
- Cinder array based volume replication
- Automated TRIM/UNMAP support in Nova and Cinder (Core feature contributed by Pure)
- Glance Image Cache for Cinder (Core feature contributed by Pure)
- Enhanced Scheduler metrics (including performance characteristics of Pure array)
- Improved Consistency Group usability (incl. CGs in Horizon)
- Automatic volume eradication option
- Fully functional Glance store on Cinder

## OPENSTACK PROJECTS PURE STORAGE INTEGRATION POINTS

Project Name	Function	Pure Integration Possible
Keystone	Identity Control	No
Horizon	Dashboard	In Beta
Glance	Image Service	Yes
Swift	Object Storage	Yes
Cinder	Block Storage	Yes
Heat	Orchestration	Yes*
Nova	Compute	Yes
Neutron	Networking	No

