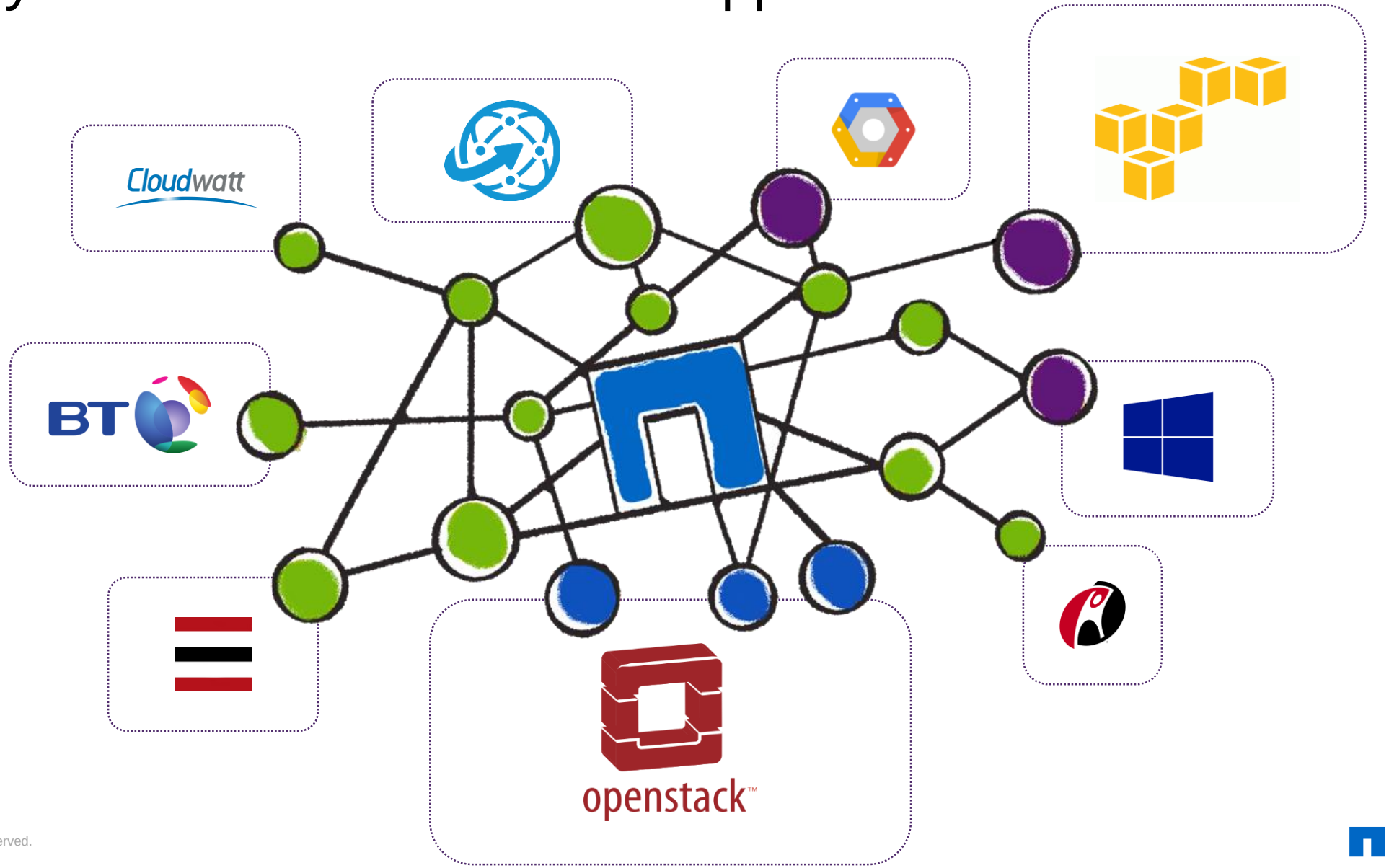
OpenStack & Netapp

February 2015

Seamlessly Connect Clouds with NetApp



NetApp

OpenStack & AWS

Equivalency & API Compatibility to Enable Hybrid Relationships

Service	OpenStack		AWS Equivalent
Compute	Nova	⟷	EC2
Block Storage	Cinder	⟷	EBS
Object Storage	Swift	⟷	S3
Networking	Neutron	⟷	VPC
Orchestration	Heat	⟷	CloudFormation
Telemetry	Ceilometer	⟷	CloudWatch
Identity	Keystone	⟷	IAM
Image Service	Glance	⟷	AMI
Dashboard	Horizon	⟷	Management Console
Database	Trove	⟷	RDS
Data Processing	Sahara	⟷	Elastic MapReduce

NetApp

A Legacy of Open Source Collaboration

Push & Pull

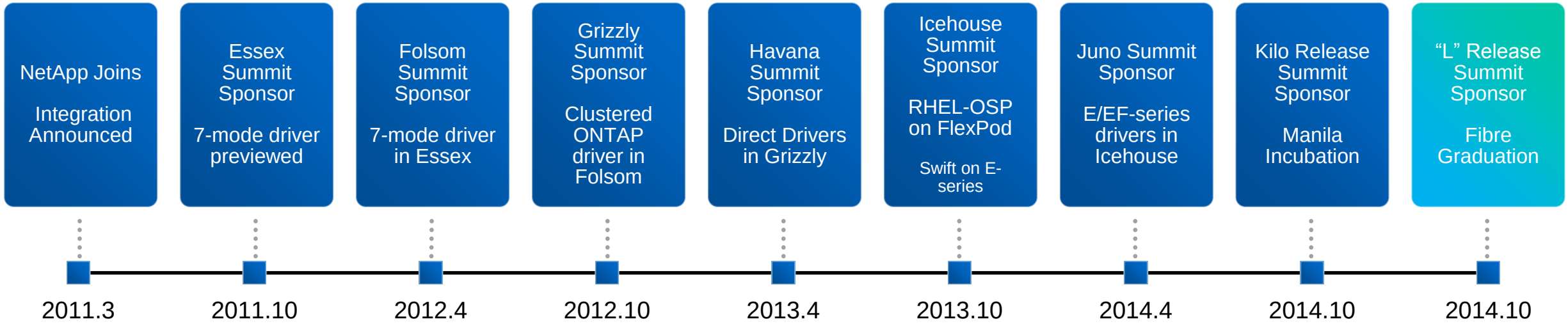
- Linux
- FreeBSD
- iSCSI
- NFS
- oVirt

- RDMA
- NDMP
- SnapCreator
- OpenStack

NetApp

NetApp OpenStack Innovation

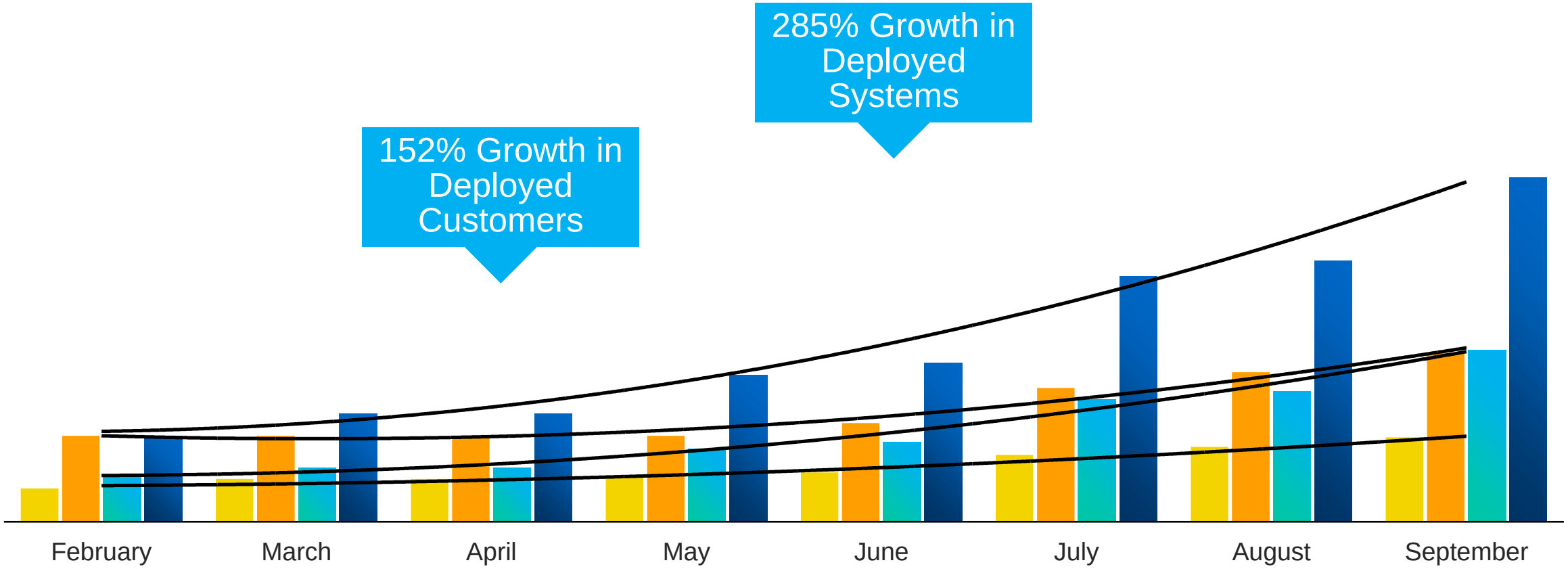
- OpenStack Foundation
  - Charter member (Gold)
  - OpenStack Summit sponsors
- 1st Major Storage Provider
  - Upstream Contributions
  - Production Deployments & Deployer



NetApp

NetApp & OpenStack Deployment

Adoption Accelerating



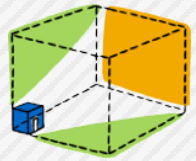
NetApp

Development Theme: Avail Core Competencies

FAS

Continuous Operations

Seamless Scaling

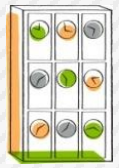


Storage Efficiency

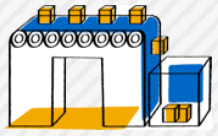
Data Mobility

Data Protection

Unified Architecture



Quality of Service

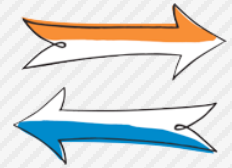


Service Automation

Secure Multi-Tenancy

E-Series

Simplicity



Horizontal Scaling

Consistency

Density

Versatility

Vast Bandwidth

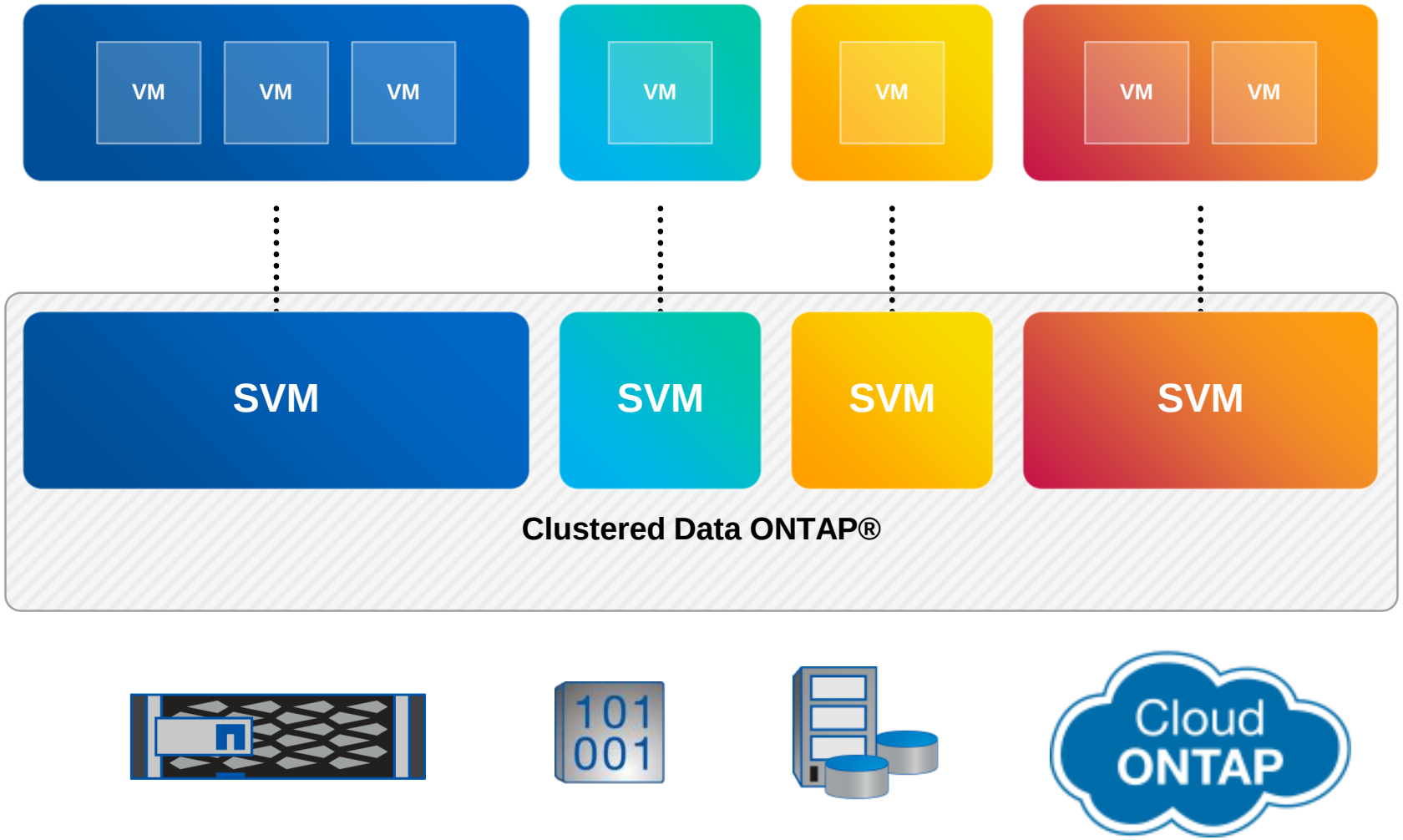
Broad Connectivity

Data Mobility

All-Flash

NetApp

Software Defined Storage, Today

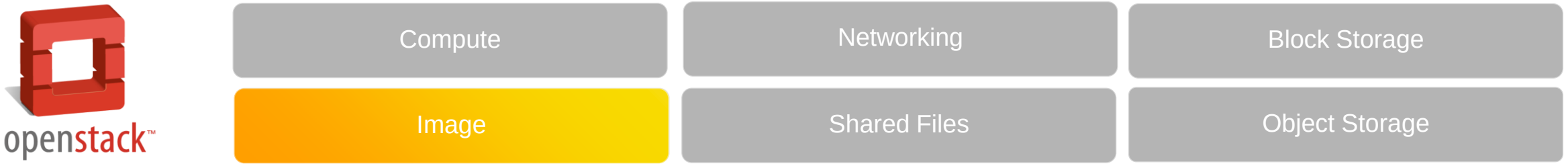


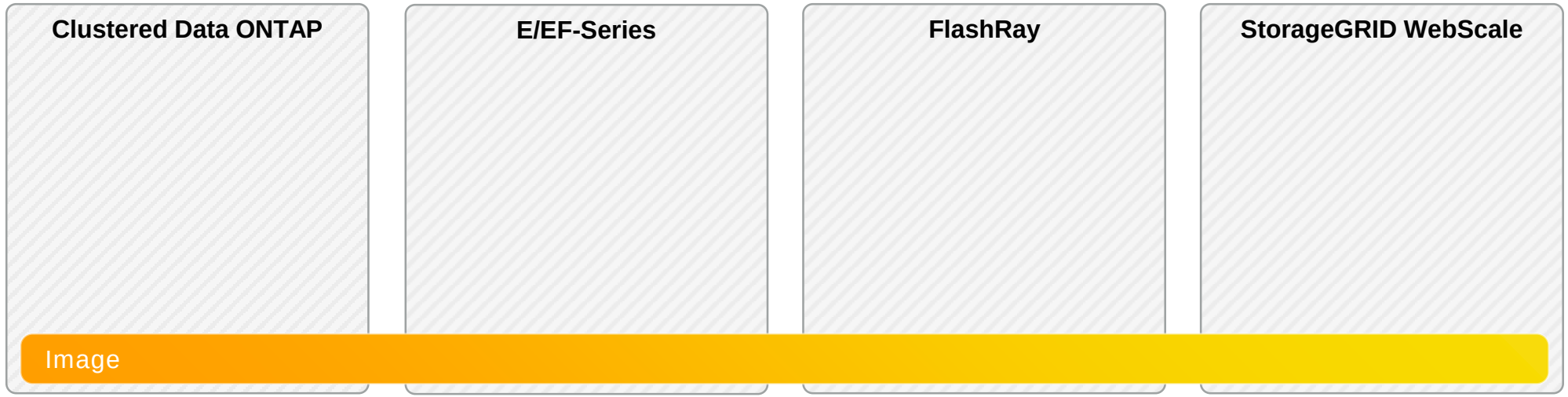
NetApp

OpenStack Integration

Integration Overview

Glance



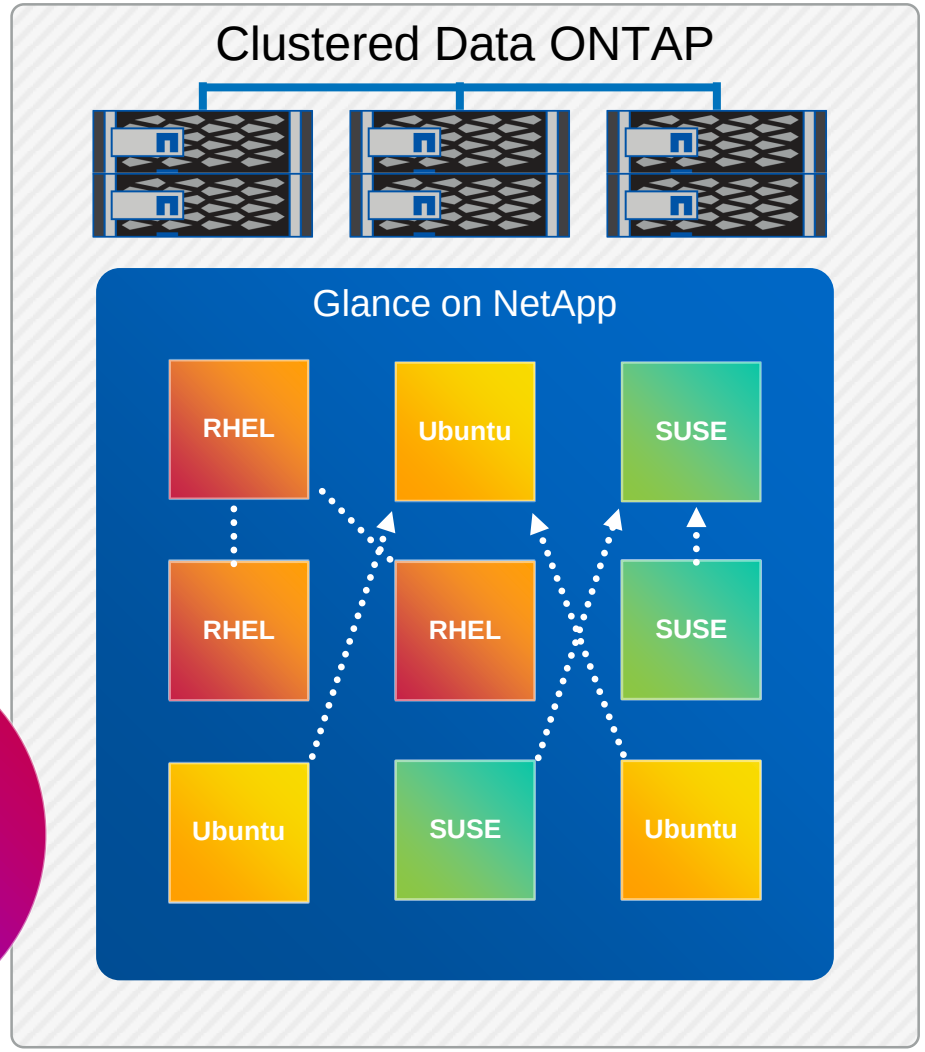


Glance on Data ONTAP

Deduplication

- File or Swift Backends
  - Simplicity advantage to File
  - rapid instance creation advantage to File
- A proven solution hardened for enterprise virtualization deployment
  - VMware, Microsoft, Xen

90%+ Deduplication rates are often observed



NetApp

Integration Overview

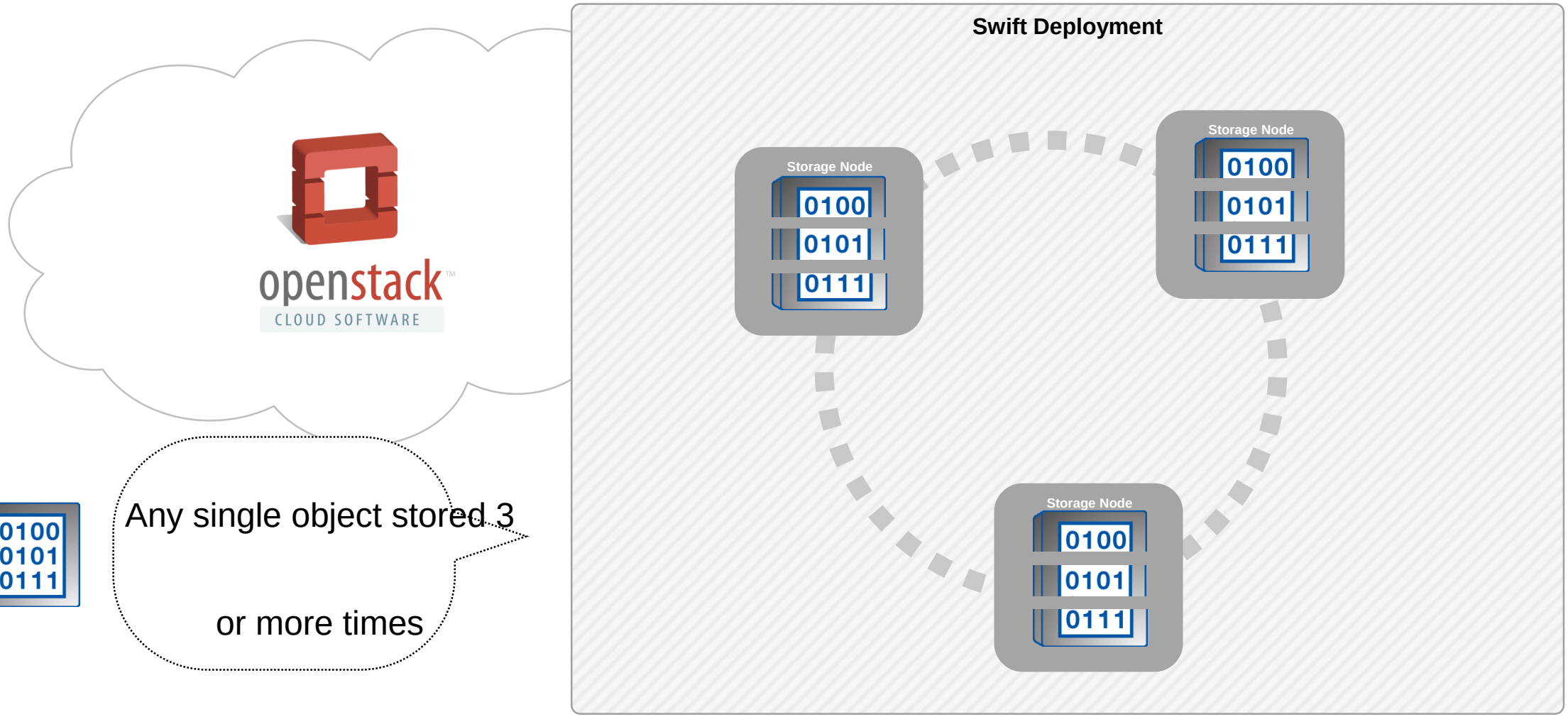
Swift

Compute	Networking	Block Storage
Image	Shared Files	Object Storage

NetApp®

3 Copies... Commonly More

Swift on JBOD

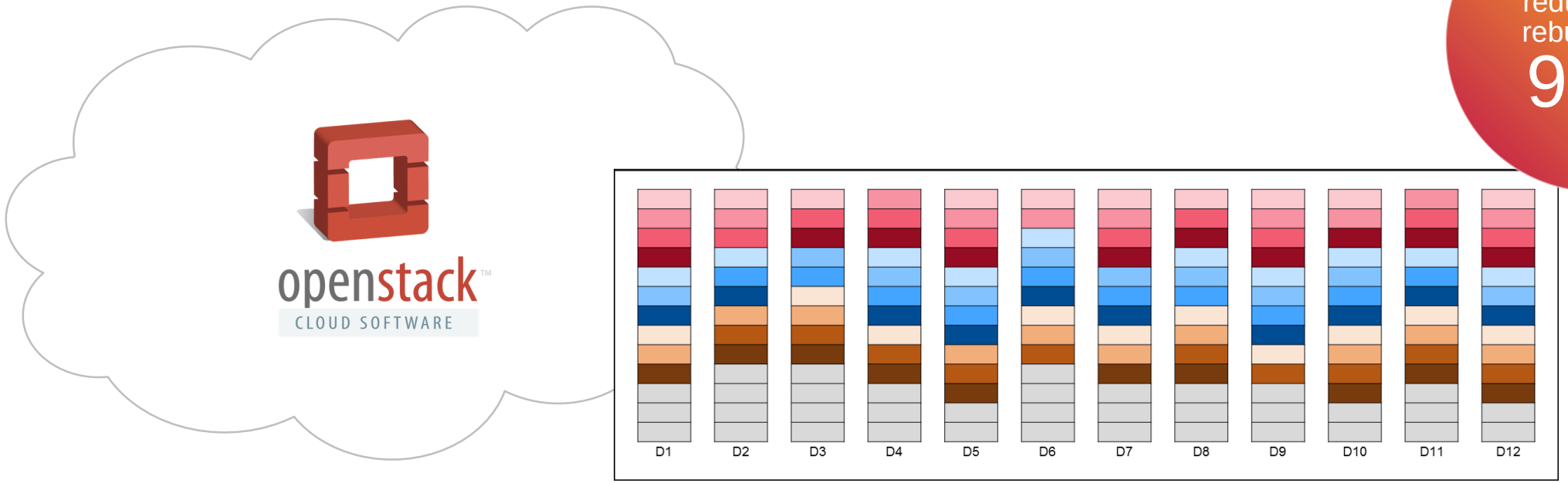


NetApp

Swift & Dynamic Disk Pools

Efficient Storage & Scaling

DDP can reduce disk rebuild time 90%

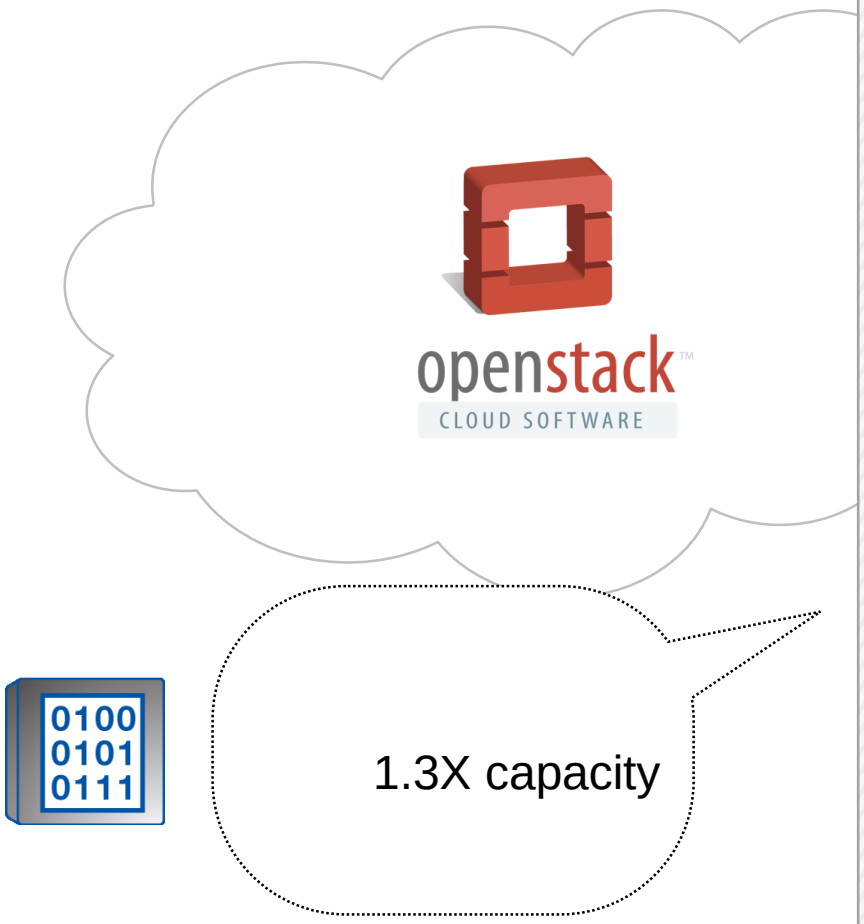


- Dynamic distribution / re-distribution of data“De-clustered” RAID
- An evolved CRUSH… node level Erasure Coding
- Space and scaling efficiency

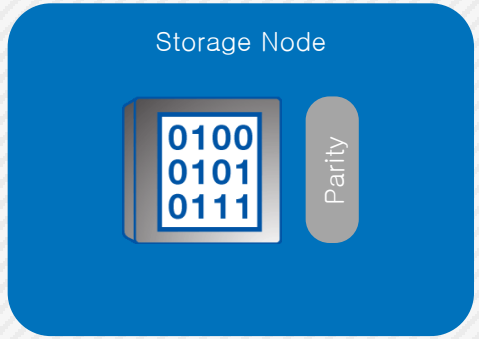
NetApp

1.3 Copies within a Site

Swift on E-series Dynamic Disk Pools



Swift Deployment



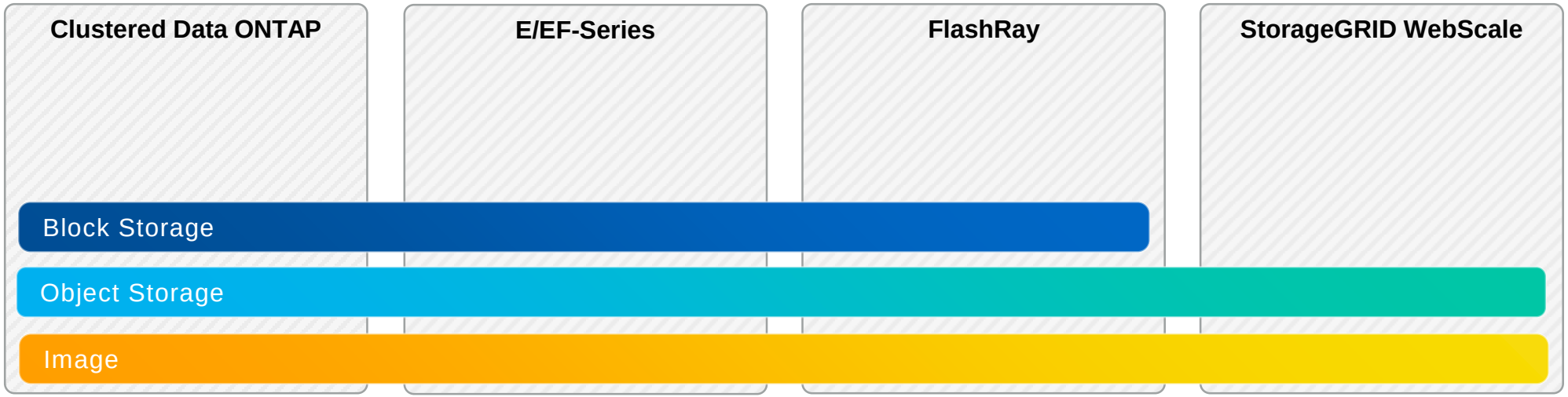
- Significant improvement in cost of operations
- Swift becomes immediately consistent within a site
- Deploy E-series across sites for even greater savings
- Efficient, reduced replication
  - eliminates a scaling inhibitor

NetApp

Integration Overview

Cinder

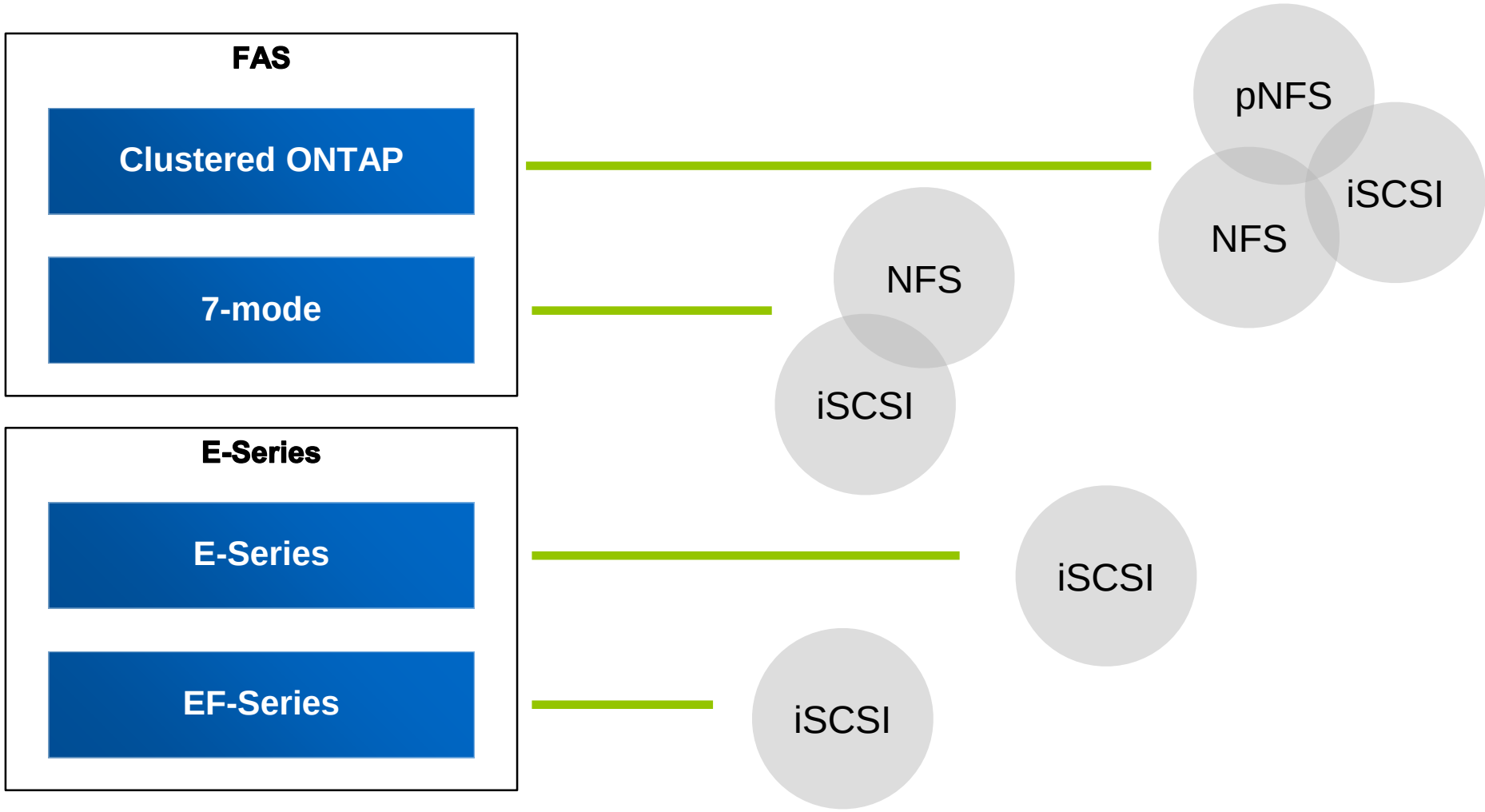
Compute	Networking	Block Storage
Image	Shared Files	Object Storage



NetApp®

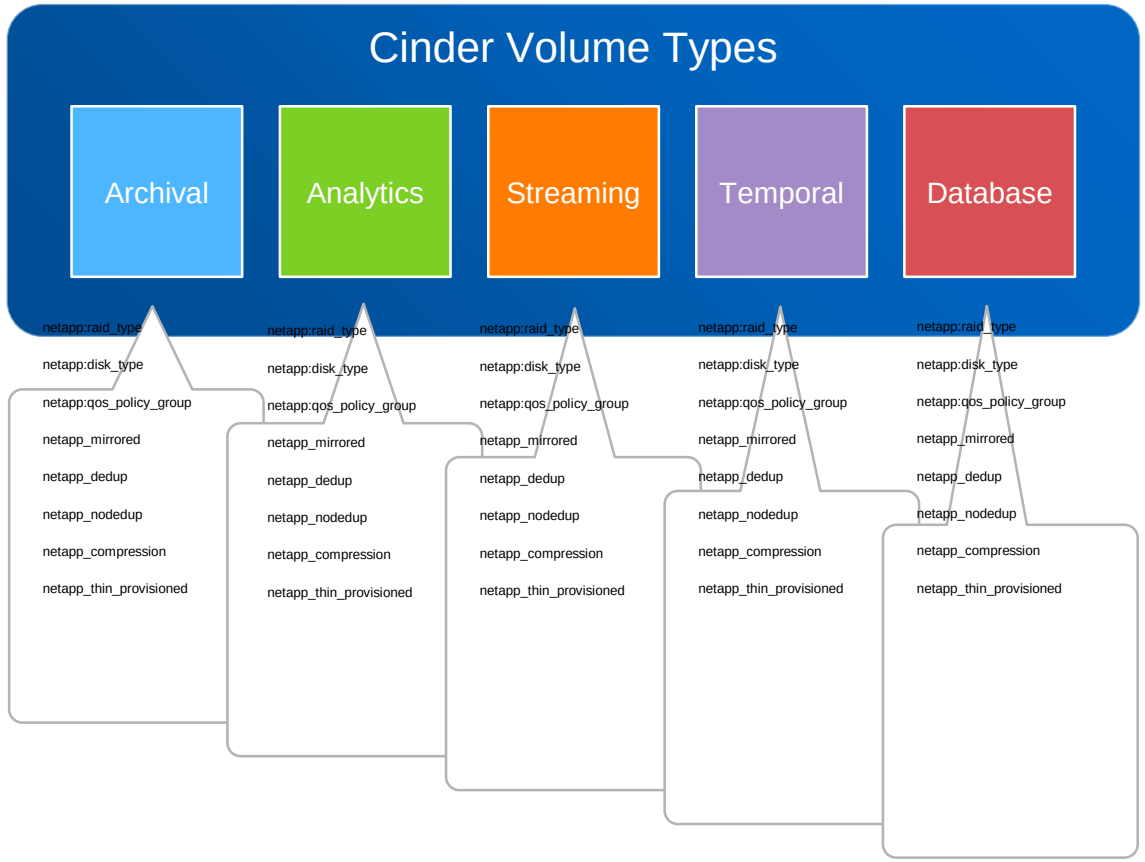
Cinder deployment with NetApp

Diverse Options for Diverse Use Cases



NetApp

Deliver a Storage Marketplace



- Craft a catalog
  - based upon tenant requirements
- Compose volume types with
  - Efficiency
  - Performance
  - Availability
  - Protection

NetApp

Policy-Based Block Storage Service

Boot 8 CentOS LAMP instances with 2TB of Silver please

Cinder

Volume Types

Gold | Silver | Bronze

openstack™ CLOUD SOFTWARE

APP OS

Clustered ONTAP

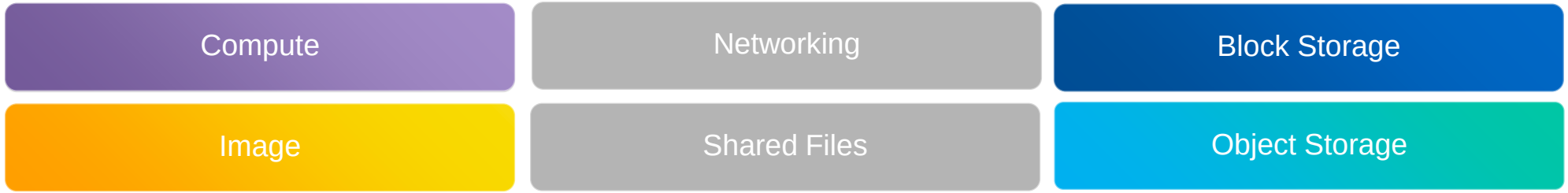
SnapMirror

Remote

NetApp

Integration Overview

Nova

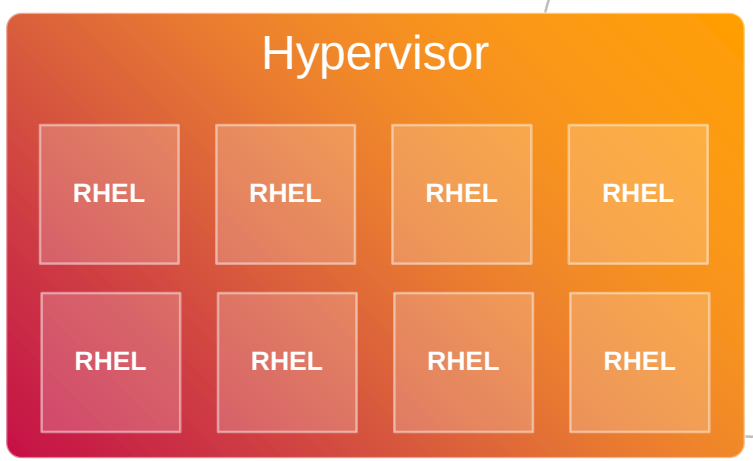


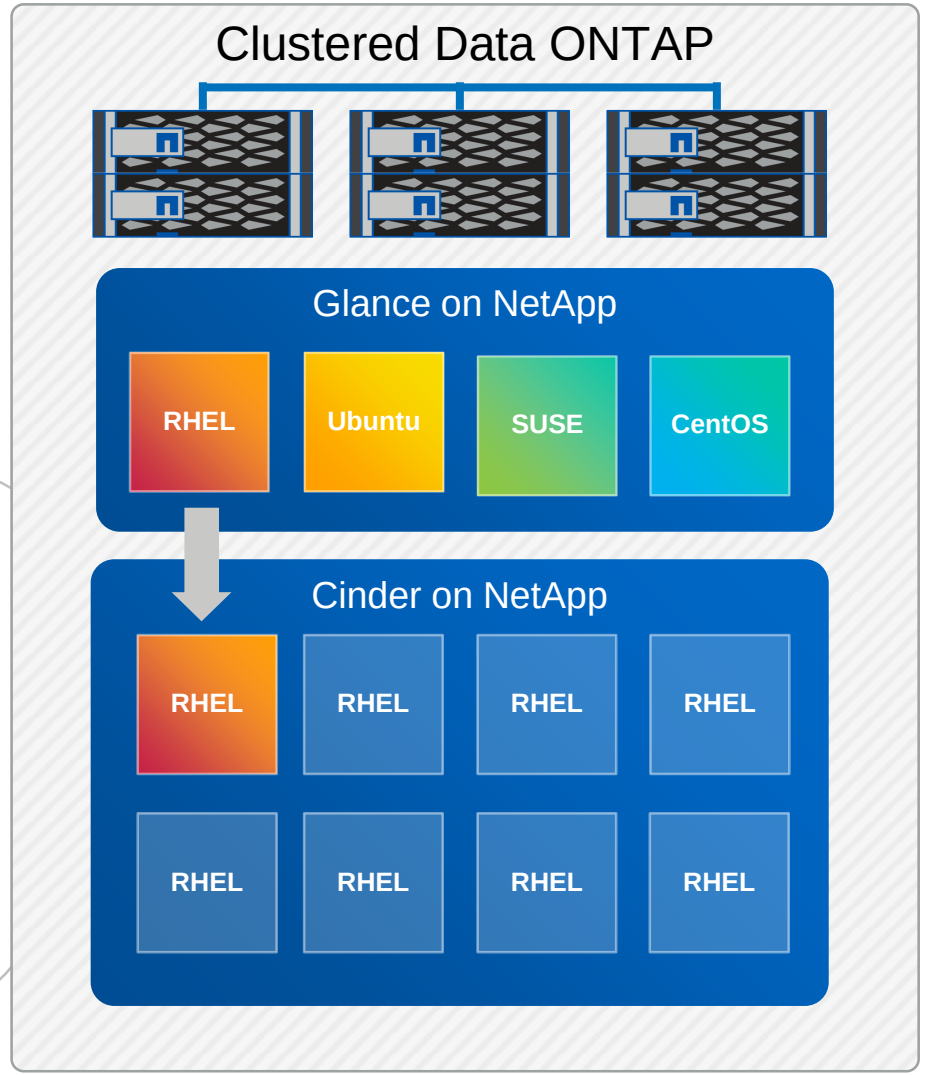
NetApp

Enhanced Instance Creation

Boot 8 persistent RHEL instances…

- Cloned, not copied
- Instances, instantly

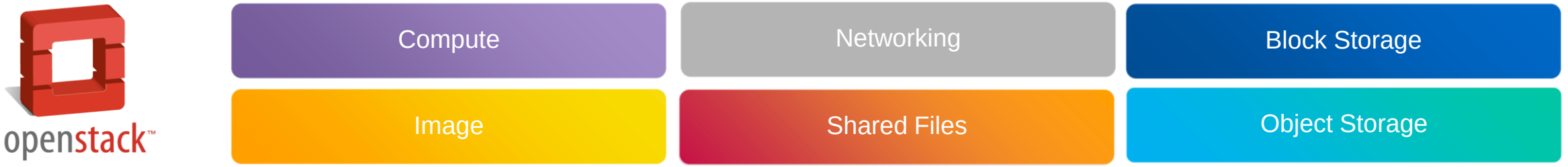


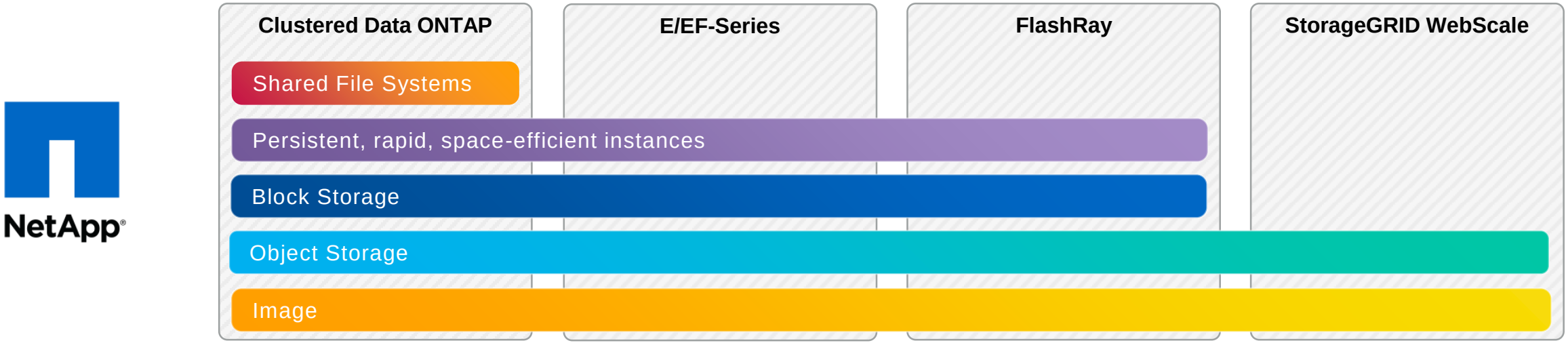


NetApp

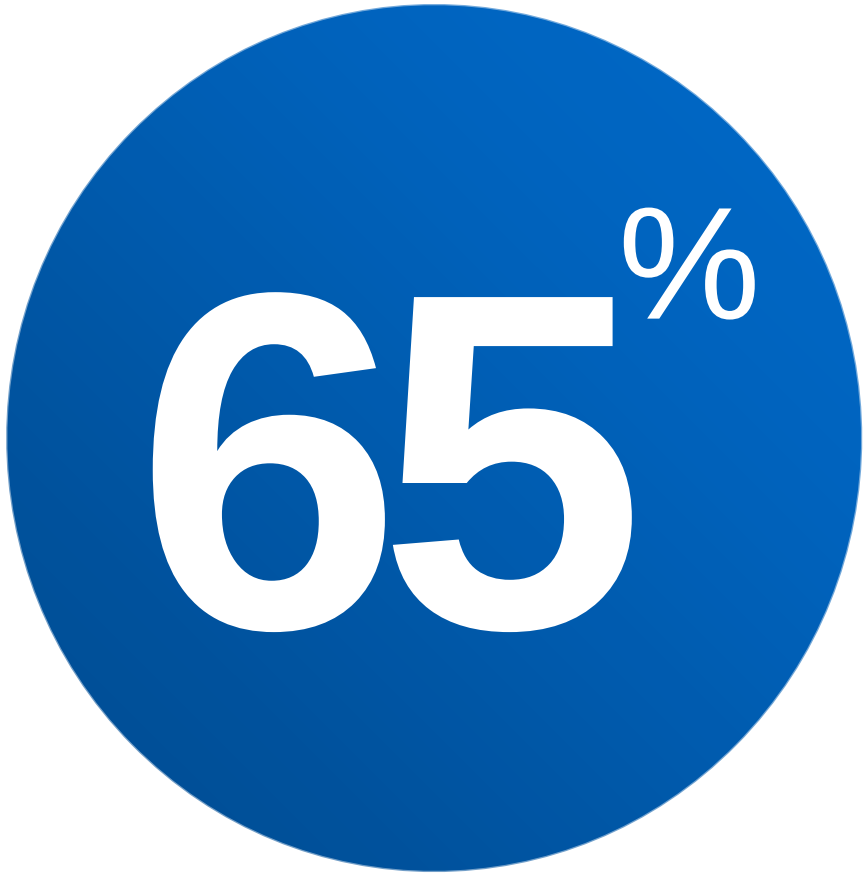
Integration Overview

Manila





NetApp



storage sold

for Shared File Systems (IDC 2012)

NetApp

Create a "Marketing" share for 2 & 4

Share "R&D" with Instances 1 & 3

Manila now formally Incubated!

openstack™ CLOUD SOFTWARE

Manila

Clustered Data ONTAP

Finance

R&D

Marketing

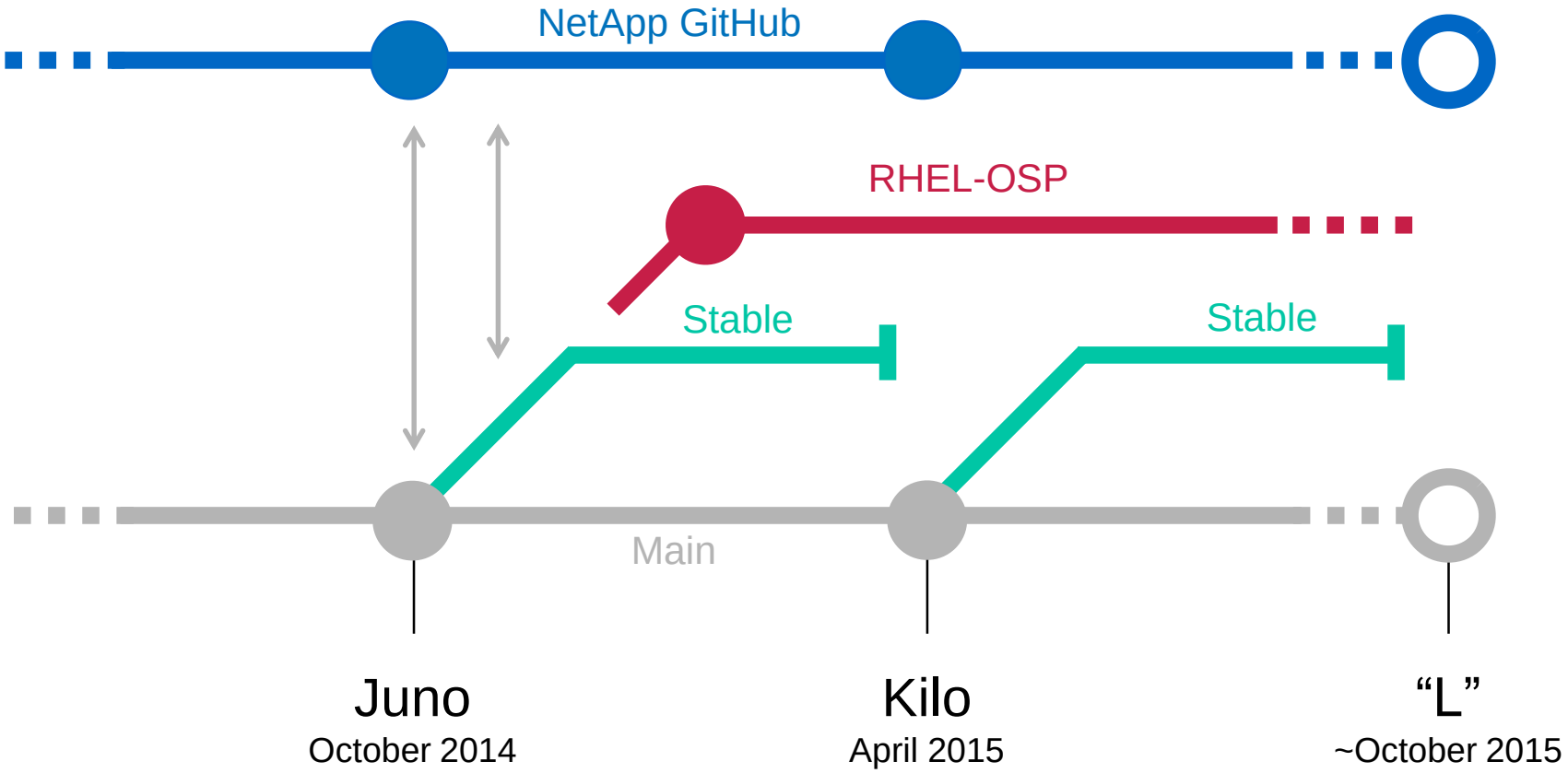
Nova

Hypervisor

VM VM VM VM VM VM

NetApp

Release Cadence / Branching



NetApp

2014 Release Summary

- E-series & EF-series Cinder
- Manila progress
  - Incubation
- pNFS
  - by default, where available
- Enhanced Instance Creation
  - copyoffload optimizations
- Reference Architectures
  - Puppet manifests for simplified deployment

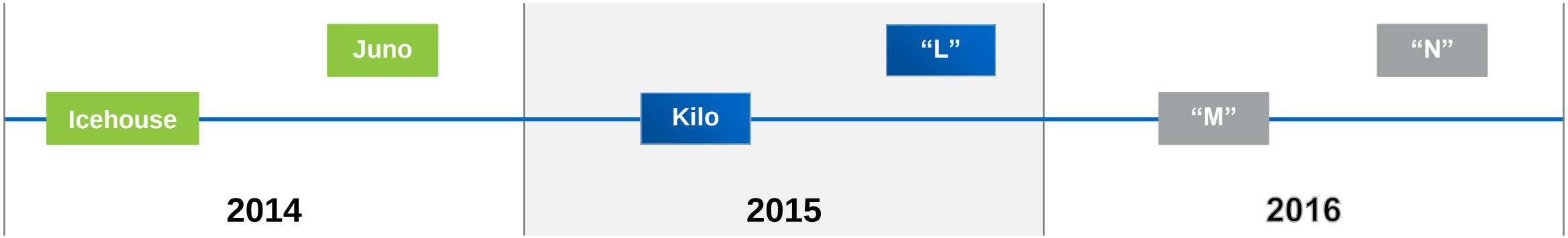
- Manila
- Cinder Currency & New Features
- Reference Architectures
- Configuration Management Tooling
- Deployment Automation
- Horizon, Heat, Ceilometer
- Fibre Channel

NetApp

Available Planned Target

Kilo & Forward

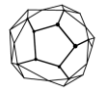
- Manila maturation & graduation
- Cinder Fibre Channel
- Cinder E-series Extra Specs
- Cinder NFS Backup Driver
- Object storage integrations
- Replication Support
- “Cloud Storage Console”
- Hybrid Cloud Management



NetApp

OpenStack Partner Integrations

Distribution Partnering




Reference Architectures

- Reference Architecture: Deploying RHEL-OSP 4 on NetApp Clustered Data ONTAP

Automating Deployment

- Puppet
  - Clustered Data ONTAP & E/EF-series
- Chef
  - Clustered Data ONTAP & E/EF-series

NetApp

Why NetApp for OpenStack?

Agile Data Infrastructure

- Build private, public, & hybrid clouds on the #1 Storage OS delivering high-performing, efficient and scalable services

Proven Storage & Data Management

- Lower risk and enable a broad spectrum of cloud SLAs by combining open-source cloud management with proven data solutions

Unified Platform

- Deploy traditional & cloud workloads together on a single efficient and proven architecture

Community Leadership & Commitment

- NetApp provides choice in cloud management though collaboration and leadership in development of open-source

BUILT FOR

openstack

NetApp

Getting Started

News

- http://netapp.com/openstack
- @openstacknetapp
- #openstack-netapp on freenode

Resources

- NetApp OpenStack Deployment and Operations Guide
- High Availability & RHEL-OSP Reference Architectures
- Red Hat & Rackspace Private Cloud Certifications
- Nebula Integrations

NetApp

OpenStack Summit

May 2015

- Vancouver, Canada
- “L” Design Summit
- First OpenStack Summit in Canada
- See you there!

NetApp

Thanks!

@openstacknetapp