No More Storage Nightmares
An Open Solution for Container Persistent Storage
CONTAINERS vs VIRTUALIZATION

Containers
- Abstracts OS Kernel
  - Mostly Linux
- One CPU and memory mgr
  - Up in seconds
  - 100s, 1000s
- Multiple copies of single app

Virtualization
- Abstracts entire device
- Any Operating System
- Two CPU and memory mgrs
  - Up in hours or days
  - 10s or 100s
  - Multiple apps
CONTAINERS:
Software packaging concept that typically includes an application and all of its runtime dependencies.

BENEFITS
- HIGHER quality software releases
- SHORTER test cycles
- EASIER application management
STORAGE FOR CONTAINERS

Why Do Containers Need Storage?
  • Containers are not persistent by default. App data is lost when containers die.

Why is container storage a pain point?
  • Complex. Even more complicated when container orchestration is involved and applications need to be scaled out

Why Red Hat Container-Native Storage (CNS)?
  • Advanced storage capabilities, deeper integration with OpenShift, better price/performance than traditional storage
  • CNS is open, scalable and has consistent user experience across the hybrid cloud (compliments the OpenShift value proposition).
WHY PERSISTENT STORAGE FOR CONTAINERS?

“For which workloads or application use cases have you used/do you anticipate to use containers?”

<table>
<thead>
<tr>
<th>Application Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Apps</td>
<td>77%</td>
</tr>
<tr>
<td>Cloud Apps</td>
<td>71%</td>
</tr>
<tr>
<td>Systems of Engagement</td>
<td>62%</td>
</tr>
<tr>
<td>Systems of Record</td>
<td>62%</td>
</tr>
<tr>
<td>Web and Commerce Software</td>
<td>57%</td>
</tr>
<tr>
<td>Mobile Apps</td>
<td>52%</td>
</tr>
<tr>
<td>Social Apps</td>
<td>46%</td>
</tr>
</tbody>
</table>

Base: 194 IT operations and development decision-makers at enterprise in APAC, EMEA, and North America
Source: A commissioned study conducted by Forrester Consulting on behalf of Red Hat, January 2015

Scalable, Cost Effective, Distributed Storage for Containers
WHAT STORAGE OPTIONS DO YOU HAVE FOR YOUR CONTAINERS?

OUTDATED STORAGE ARRAYS AND APPLIANCES
- Scalability and high availability fall short of customer needs
- Vendor lock in and high TCO
- Monolithic appliance model

SILOED OR POINT PLAY STORAGE SOLUTIONS
- No hybrid cloud support
- No unified control plane (K8s)
- Lack of automated or dynamic provisioning of storage

PORTABLE STORAGE ACROSS ON-PREM / MULTIPLE PUBLIC CLOUDS

Container-Native Storage from Red Hat
- Runs to all public and hybrid clouds
- Single Vendor Support model
- Seamless user experience for developers
Containers Need Two Kinds of Storage

- **Persistent Storage**
  - Registry
  - Metrics
  - Logging
- **Ephemeral Storage**
- **Stateful Applications**
- **Stateless Applications**
- **Pod Image Storage**
GREATER PORTABILITY, AUTOMATION AND INTEGRATION
Container Native Storage (CNS) Deployment with OpenShift

Storage Class Examples:
- Fast Pool = 3x OCP nodes with SSDs
- Slow Pool = 3x OCP nodes with HDDs

Pods on OCP nodes without local storage can mount volumes from Fast and Slow Storage Classes
OpenShift Persistent Storage System

- **PersistentVolumeClaim**
  - "submits" to
  - Storage Class
  - "submitted to" Persistent Volume
  - "creates"
  - "instructs" Storage Backend
  - "provisions"

- **Storage Backend**
  - "mounted by" APPLICATION POD(S)

- **Developer**
  - "submits" to PersistentVolumeClaim

- **Operations**
  - "sets up"
How OpenShift Requests Persistent Volume

Steps:

- OpenShift calls Heketi through RESTful API found in Storage Class object
- Heketi provisions volume on Gluster
Storage Class Use And Definition

Steps:
- Done after CNS or CRS cluster is created
- API call using Heketi route, Heketi cluster ID and credentials

Example: OpenShift Storage Class YAML File

```
# cat cns-fast-storageclass.yaml
apiVersion: storage.k8s.io/v1beta1
kind: StorageClass
metadata:
  name: cns01-vmdk-gluster-fast
provisioner: kubernetes.io/glusterfs
parameters:
  resturl: http://heketi-storage.apps.syseng.com
  clusterid: d0a035dc9022343480fcb0ec9de307
  restauthenabled: "true"
  restuser: "admin"
  secretNamespace: "default"
  secretName: "heketi-secret"
```
CONTAINER-NATIVE STORAGE

- Lower TCO
- Unified Orchestration
- Ease of Use
- Greater control
WHAT IS CONTAINER-NATIVE STORAGE?

The de facto storage for Red Hat OpenShift Container Platform

**Highly scalable, production-grade persistent storage**

- For containerized applications in Red Hat® OpenShift
- Optimized as a storage backend for Red Hat OpenShift infrastructure
- Ideal for replacement of legacy storage

**Built on battle-tested Red Hat Gluster Storage**

- Capable of supporting multipetabyte workloads
- Developed, maintained, and deployed in synch with Red Hat OpenShift releases
- Supported via a single contract with Red Hat OpenShift
CUSTOMER SUCCESS

**BENEFITS**

- **NEW AGILITIES** allowed telco to bring a new offering to market faster and cheaper
- **LOWER COST** than traditional storage and avoiding endless commitment to proprietary vendors
- **FLEXIBLE** geo-replicated architecture can grow/shrink dynamically
- **OPTION** to be tuned for price or performance

**HYPER CONVERGED STORAGE**

- Applications and storage can co-exist on the same hardware
- Higher server utilization and lowers operational costs
- Storage generates only 3%-10% overhead on compute servers
Consistent Storage Experience Across The Hybrid Cloud

Application Portability And Lower Costs

- **BARE METAL**
  - RED HAT ENTERPRISE LINUX

- **VIRTUAL MACHINES**
  - vm

- **CONTAINERS**
  - RED HAT OSENV

- **PRIVATE CLOUD**
  - RED HAT OPENSTACK PLATFORM

- **PUBLIC CLOUD**
  - Google Cloud Platform
  - Microsoft Azure

- **LEGACY STORAGE**

**RED HAT CONTAINER NATIVE STORAGE**

**RED HAT OPENSIFT CONTAINER PLATFORM**
TEST DRIVE
OPENSIFT WITH CONTAINER-NATIVE STORAGE

https://goo.gl/wYg2vF

- 8 hours of complimentary labs
- Hands-on exercises to demo OpenShift Container Platform and Container-Native Storage
- Multi-node OCP deployment
THANK YOU

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