



Hack The Stack:

High-Performance OpenShift Container
Environments On Bare Metal

Agenda

- Building A Production Container Environment: What's involved
- Challenges: Day 1, Day 2, Day 3
- The DIY Container Stack
- Openshift + VM – Reference Architecture
- Openshift + Bare-Metal + HCI – Reference Architecture
- A Look At The Diamanti Bare Metal Container Platform, With OpenShift Support

Building A Production Container Environment: Day 1

- **Hardware requirements**
- **Multi-Zone environment**
- **Hybrid Cloud**
- **VM Tax (Hypervisor) or Bare-metal**
- **Network requirements**
 - Which CNI to use? How does it fit in with existing network standards?
- **Storage requirements**
 - Which CSIs to use? (NFS, iSCSI, Dynamic Provisioning??)
- **Kubernetes Distribution**
 - OpenShift, Diamanti, DIY, Rancher
- **Monitoring/Security**
 - Integrating with existing enterprise products, standards and policies

Building A Production Container Environment: Day 2

■ Setup:

- Hardware

■ Install:

- OS
- Kubernetes Distribution
- CNI Plugins
- CSI Plugins
- Monitoring Agents
- Security Agents

■ Configure:

- Components and Software
- Role Based Access Control (RBAC)

Building A Production Container Environment: Day 3

- **Backup/restore**
- **Health monitoring (e.g. Splunk/SNMP)**
- **Support**
 - Hardware replacement
 - Multiple vendors? (CSI, CNI, etc.)
- **Training**
- **Upgrades**
- **Platform optimization and container sizing**



Challenges

Day 1 Challenges

■ Hardware requirements

- Supported APIs for infrastructure automation
- External SAN/NAS

■ VMs or bare metal infrastructure

- **Hypervisor** (licensing, maintenance, administration, under utilized resources, performance)
 - Overlay network on top of overlay network
- **Run containers on bare metal**
 - No Licensing
 - Optimized resource utilization
 - Simple orchestrator
 - High performance

Day 1 Challenges

■ Network Requirements

- Which CNI to use?
 - Flannel
 - Calico
 - Etc
- Does it fit with corporate standards?
 - Firewall
 - Load Balancers
- Ingress/egress control

■ Multi-zoned installs

- Failure domains for cluster and applications
- How far are your data centers from each other?

Day 1 Challenges

■ Storage

- Which CSIs to use?

- Each SAN/NAS vendor has its own implementation

- Hyperconverged

- Hyperconvergence using Software
 - Scalability and performance concerns
 - Host Resource overhead
- Hardware accelerated Hyperconvergence
 - Storage is high performance
 - Scalable and no host resource

overhead

■ SAN/NAS

- has scalability problems with exponential microservice deployments, furthest from compute

Day 1 Challenges

■ Kubernetes Distribution

- Full stack solution (Kube, Docker, CNI, CSI, etc is bundled)
 - Diamanti

- OpenShift

- Do-It-Yourself

- Hello World! vs Real World! Challenges
 - Scalability
 - Upgrades
 - Maintenance
 - Support
 - User Adoption
 - overhead

Day 1 Challenges

■ Monitoring

- Integrating with existing products
- Alerting
- Capacity planning
- Debugging: performance and failures

■ Security

- Integrating with existing policies and products
- Enforcement of policies
- Certificate management
- Access controls

Day 2 Challenges

■ Setup

- VM Tax
 - Do we need more hypervisor nodes?

■ Install

- How do I install base OS and keep it updated?
- Kubernetes Distribution
 - How do I install?
 - Possible to install across Multi-zone environment?
 - Air gapped installs

- Install CNI

- Does it integrate with my existing network?
- Network resource provisioning: IP address allocation and management
- Load Balancer integration
- Firewall integration

Day 2 Challenges

- **CSI**
 - Do I have a driver for my existing storage infrastructure?
 - Storage ACLs & RBAC
 - Setup performance policies
 - Extend SAN/NAS environments
- **Monitoring/Security Agents**
 - Are they able to provide the necessary information and control?
 - Agents for existing monitoring solutions?
 - Install monitoring and security agents
 - Install and configure policies

Day 2 Challenges

■ Configuration

- Check everything is healthy and communicating
- Are you able to provision storage?
- Are containers able to communicate outside of the cluster?
- Are things able to reach containers inside the cluster?
- Are the proper RBAC controls in place to allow
- Multi-tenancy
 - Noisy neighbor problem?
 - Workload isolations

Day 3 Challenges

- **Backup/restore**

- Cluster configuration
- Workload data

- **Health monitoring & alerting**

- SNMP

- **Support**

- How do you replace hardware?
- Multiple vendors for each component (CSI, CNI, etc)
- Debugging platform issues

Day 3 Challenges

■ Training

- End user
- On-boarding existing applications

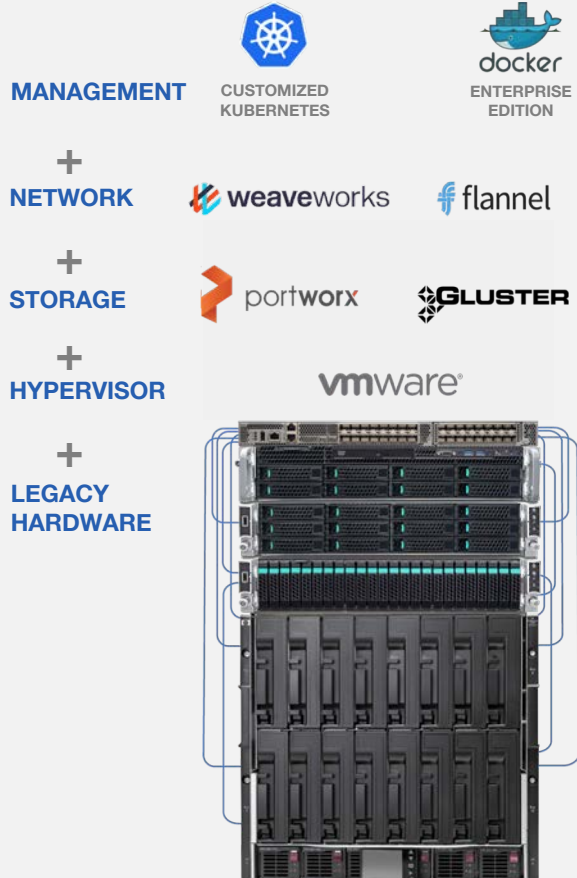
■ Upgrades

- What is the proper “Recipe” to ensure successful upgrade?
 - OS, Docker, Kubernetes, CSI, CNI?
 - Docker, Kubernetes, CSI, CNI, OS?

■ Platform optimization and container sizing

- Resource utilization granularity

DIY: Reference Architecture



Orchestrator and
runtime licensing
& support

\$\$

SDN / CNI
licensing &
support

\$\$

SDS / CSI
licensing &
support

\$\$

Hypervisor
licensing

\$\$\$

x86 20-core
servers

\$\$

Storage arrays

\$\$\$

Network switches

\$\$

TOTAL COST

16x \$

TIMELINE

6-9 mos.

RESOURCES



HARD

DAY 1

HARD

DAY 2

HARD

DAY 3

OpenShift + VM – Reference Architecture

MANAGEMENT



OPENSIFT

+
NETWORK



SDN



+
STORAGE



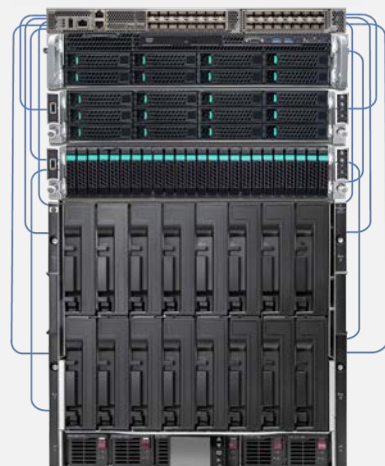
portworx



+
HYPERVISOR



+
LEGACY
HARDWARE



Orchestrator and
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\$\$\$

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RESOURCES



EASY

DAY 1

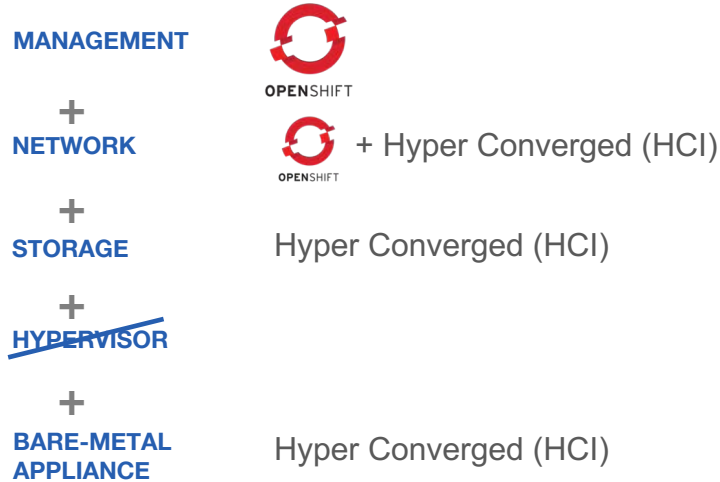
MED

DAY 2

MED

DAY 3

Openshift + Bare-metal + HCI – Reference Architecture



Orchestrator and
runtime licensing
& support

\$\$\$

Appliance

\$\$

Support

\$

TOTAL COST

6x \$

TIMELINE

1 mo.

RESOURCES



EASY

DAY 1

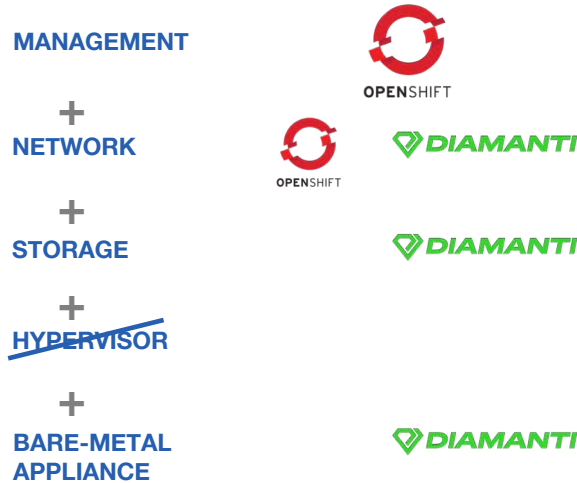
EASY

DAY 2

EASY

DAY 3

Openshift + Bare-metal + HCI – Reference Architecture



Orchestrator and
runtime licensing
& support

\$\$\$

Appliance

\$\$

Support

\$

TOTAL COST

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TIMELINE

1 mo.

RESOURCES



EASY

DAY 1

EASY

DAY 2

EASY

DAY 3

Diamanti Bare Metal Container Platform + OpenShift

Complete turnkey container stack

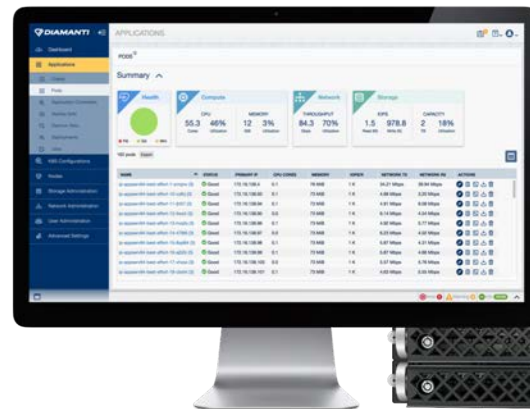
- Hyperconverged 1U appliance built on x86 architecture
- Features container-optimized networking and storage models
- Entire solution is fully supported by Diamanti
- Best developer experience via OpenShift

Built for cloud

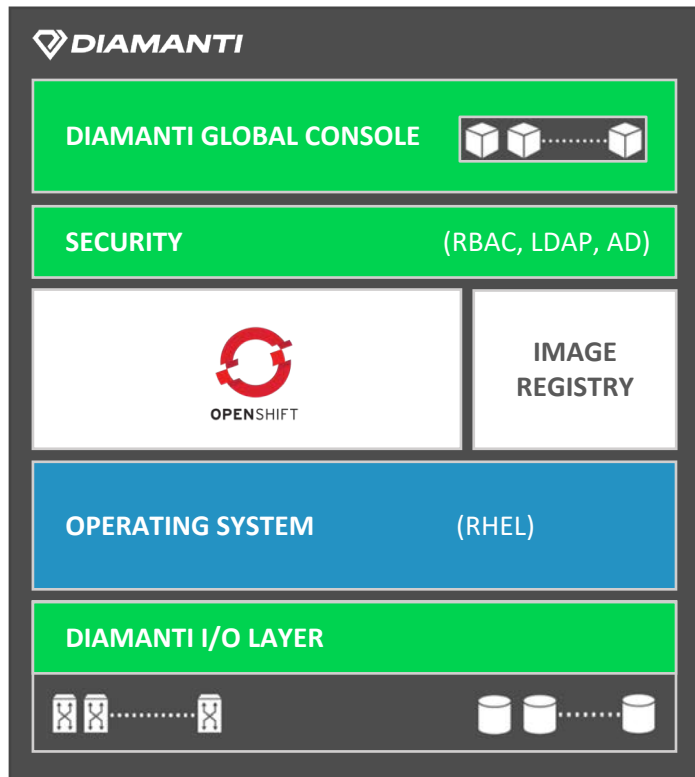
- Manage multiple on-prem clusters and hybrid-cloud deployments through single UI
- Enterprise DP/DR features: mirroring/synchronous replication, snapshots/asynchronous replication
- Burst production workloads to the cloud

Benefits:

- High performance
- Efficient
- Secure
- Installs in minutes
- Low TCO



Diamanti Bare Metal Container Stack



Single management pane

- Campus cluster
- Multi-cluster
- Data protection (DP) and disaster recovery (DR)
- Hybrid-cloud and multi-cloud
- Security, monitoring, logging

Red Hat OpenShift

Bare metal

- ~~Hypervisor~~

Container-optimized I/O

- PCIe network virtualization
- PCIe storage virtualization

Next Steps

■ Resources

- Datasheet: [Diamanti D10](#)
- Analyst report: [ESG Review of Diamanti D10](#)
- Customer reviews: [Gartner Peer Insights](#)
- White paper: [Five Reasons To Run Containers on Bare Metal, Not VMs](#)





Q&A



Thank You