Storage Fault Tolerance in Hyper-Converged Clouds running Red Hat OpenStack Platform

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High Availability of Application Data

Directly impacts Business Continuity

Outages are expensive!

Tier-1 workloads - the most demanding apps and that need protection
OpenStack Hyper-converged Environment
Storage Faults in hyper-converged environments

- Host OS/hardware failure
- Storage media failure
- Storage connectivity loss
- Network failure
- Storage service dead
Fault Tolerance Mechanisms

- Mirroring & Striping
  - Need extra storage for full copy of data
  - No impact to I/O performance
  - Zero RPO

- Erasure Coding
  - Need extra storage for erasure codes
  - Some impact to I/O performance
  - Zero RPO

- Snapshots & Backups
  - Need extra storage for snapshot data
  - Indirect impact to I/O performance
  - RPO up to last snapshot/backup
Introducing Data Plane!

Data Plane
- Point-in-Time copies of VMs
- Real-time fault recovery
- Rapid VM provisioning
- “Off-hosting” – Running VMs not impacted by Backup operations
- Optimized for sequential IOs

Compute Plane
- Running VMs
- 1 Full copy of VM + delta change
- Optimized for random IOs
- Set IO policies for performance

Compute Nodes (Primary)

Data Nodes (Secondary)

Periodic sync

Network switch

Compute Plane & Data Plane

Backup

Full Image

Delta

Delta

VM

VM

VM

VM

VM

VM

HyperScale

HyperScale

HyperScale

HyperScale
Storage Fault handling in Veritas HyperScale

Storage Hardware Failure on compute:
- Redirect I/Os to reflection target
- Storage ownership failover
- Restore reflection factor
- Live migrate VM
Storage Fault handling in Veritas HyperScale

Storage Service Failure on compute:
• Redirect I/Os to reflection target
• Storage ownership failover
• Service restart
• Storage ownership failback
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Compute Host OS/hardware failure:
- Auto-evacuate all VMs
- Restore reflection factor
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Storage Failure or Host OS/hardware on datanode:
- No impact to VMs on compute
- Data node failover
- Restore DN reflection factor
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Storage service failed on datanode:
- No impact to VMs on compute Data node failover
- Service restart
- Data node resync
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Network failure:
• No impact to VMs on compute
• Data node services unavailable
• Restore network
• Re-enable data node
Storage Fault handling in Veritas HyperScale

Storage Fault Tolerance summary:

For hot data, at compute plane
• 1 Full copy and reflected delta writes
• Space optimized usage of SSD tier

For warm data, at data plane
• 1 Full copy and incremental snapshots
• Inexpensive commodity HDD tier

For cold data, at external backup server
• Scheduled periodic backups
• No impact to primary compute
Veritas™ HyperScale for OpenStack
Software-defined storage designed for OpenStack
Veritas HyperScale Value Props

- Simplified Storage Management GUI
- Predictable I/O Performance
- Compute and Storage Scalability
- No noisy neighbours!
- Storage resiliency for all data tiers
- Integrated Zero Window Backups
Storage Fault Tolerance for Red Hat OSP in action!
THANK YOU

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