VMware Virtual Volumes (vVOLS) – Nashville VMUG Converge April 2015
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ROLTA ADVIZEX

Virtual Volumes – Nashville VMUG Converge 2015

Eric Wamsley
VCP5-DCV, VCAP5-DCA, VCAP5-DCD

www.advizex.com

When AdvizeX and Rolta merged in 2012, the result was a new kind of company—one that could take enterprises further with expert solution planning, business application development, a best-of-breed mix of hardware and software to support those applications, and a global services team to keep them running smoothly 24 hours a day, seven days a week.

When you look at AdvizeX today, you see more than a local technology partner. You see a global technology leader with:

- Consistently high performance and longevity;
- A diverse team of more than 2,500 hardware and software technicians;
- 1,000+ IT certifications including many at the highest levels;
- 98% customer retention in 2013

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We operate in a competitive market, yet we stand out in that market because of our passion for innovation and our commitment to excellence. We're proud to have earned some of the industry's highest accolades including:

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- Recipients of eight Oracle Titan awards and authors of seven of the Top 10 selling books on Oracle Press;
- Microsoft Top 250 partner;
- Red Hat Rising Star Award in 2013;
- SAP Pinnacle Awards Winner in 2014.

Virtual Volumes

- Current State of Storage
- Storage's Next Level
- Review of VVOLS
- Demonstrations
- Questions

Storage - The Forgotten Child

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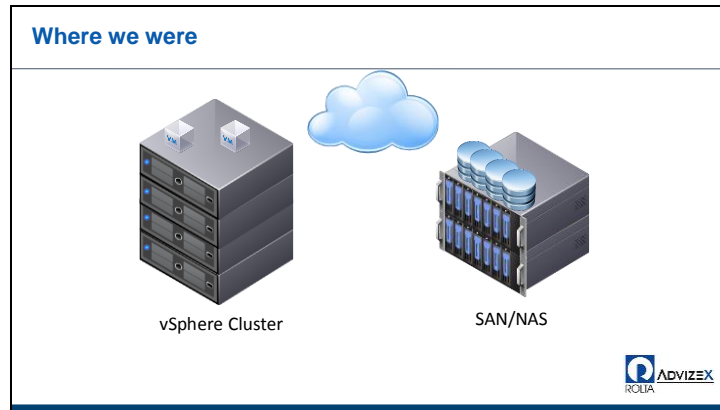
Things are great, we have a nice datacenter or data closet. In it we have our vSphere Clusters and our Storage Arrays.
VMs running on our servers and storage.
Lots of stuff. Blinking lights. Green checkmarks.

Things over here in the vSphere cluster keep getting better. There are Distributed Switches, basically making my network its own abstract thing.

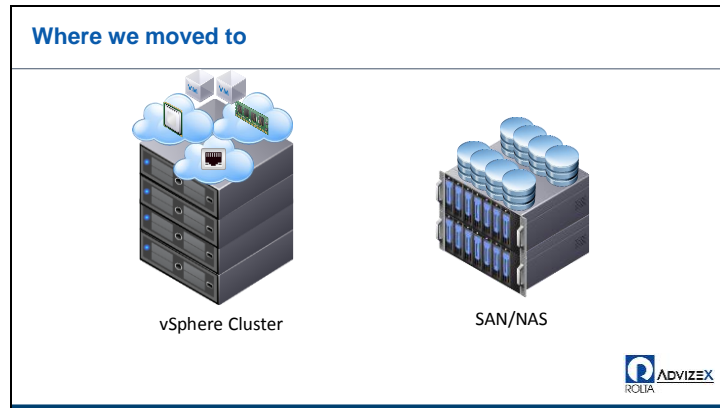**My CPU and Memory are in this sexy DRS (distributed resource scheduler) clusters that even auto load balance. They make up resource pools (cluster is root RP)**

I've got vSphere HA when one of my hosts crashes.

Maintenance mode.

Automated patching with update manager.

Backups with VDP. vSphere Data Protection

Disaster recovery with SRM. Site Recovery Manager

Replication with VR. vSphere Replication

But my poor ol storage over here still just has some luns that are dumb and just chug along.
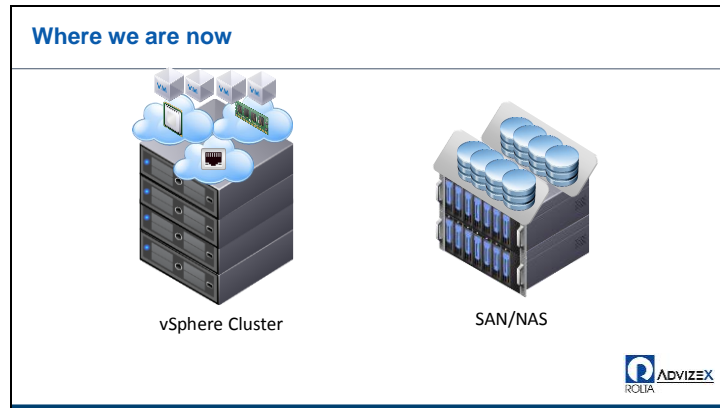
But wait! Storage Clusters come out. And I can…. Group my storage?
Well that's cool, I can do SOIC (storage I/O Control)
I can do storage DRS
I can make these storage policies for my VM's that I can kind of use
I can do some throttling and QoS
But I still have some LUNS or Volumes on this here SAN/NAS
And Networking just got even cooler with NSX. What the hey!
Why does my compute get all the sexy features?

Enter Virtual Volumes (VVOLS)

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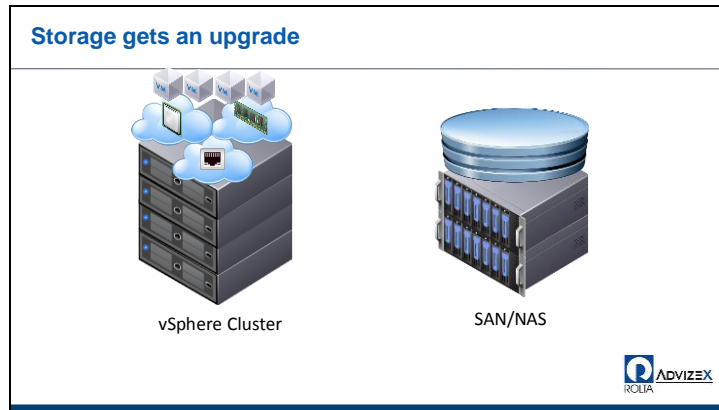
Now with Virtual Volumes (VVOLS) my SAN (or NAS) becomes the datastore.

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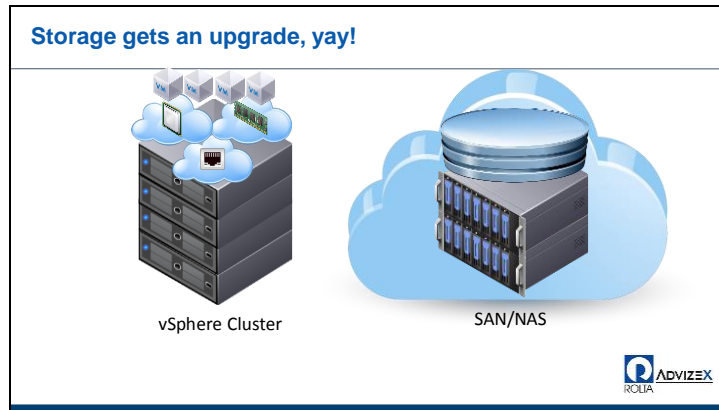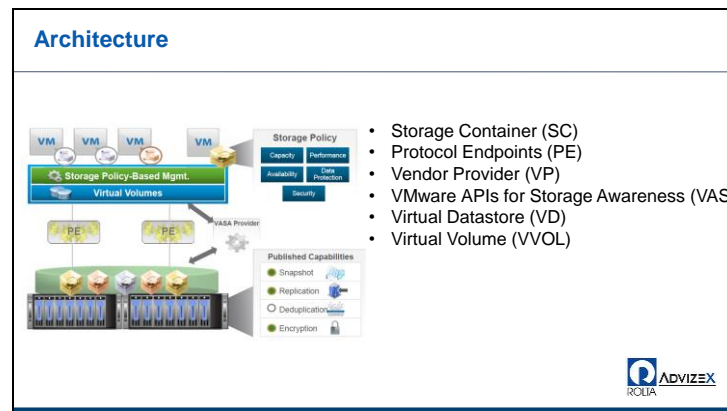Rolta AdvizeX http://www.AdvizeX.com

Storage gets an upgrade, yay!

vSphere Cluster   SAN/NAS

:)

In your SAN/NAS administration portal you can create a single Storage Container (SC) and configure Protocol Endpoints (PE) with all your configuration options

You configure a Vendor Provider (VP) in the vSphere Web Portal (the URL for the APIs on the SAN/NAS)

The SAN and your vCenter server have a quick conversation about capabilities through the VMware APIs for Storage Awareness (VASA) that you configured in the VP

You go through the process to create a new Datastore in the vSphere Web Portal but select the type as VVOL (instead of VMFS or NFS)

And you get a Virtual Datastore, which is a representation of the Storage Container, otherwise known as your array

Then you go clone, create, move, delete, expand your virtual machines (VMs) and they are each given their own VVOL inside the storage container based on your Storage Policy Based Management (SPBM)

VVOLS for everybody

- Data VVOL
- Config VVOL
- Mem VVOL
- Swap VVOL
- Other VVOL

- Single Storage Container <=2^64 (!)
- Single VVOL <=62TB
- Up to 64,000 VVOLS per host
- Up to 256 SC per host

Data VVOL has ONLY a single virtual disk (VDMK)
Config VVOL has all your nvram, vmx, logs, and other configuration files for a single VM
Mem VVOL has ONLY one snapshot
Swap VVOL has ONLY the .vswp file (v swap)
Other VVOL is for vendor specific files

Each storage container (remember, array) can be 2^64 (if this is bits, bytes, or vbits we don't know) but we are talking exabytes (exbibits?) (exabits?) do we even have enough electricity??
A single Virtual Volume can reach a maximum of 62TB (so a VDMK can reach 62TB), a single snapshot can reach 62TB, etc
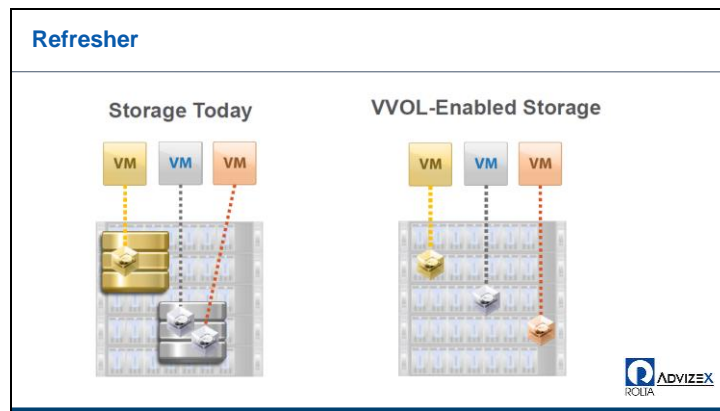**vSphere:**
Max: 1024 VMs per host, so 62 VVOLS per VM if you had 1000 VMs on your host
Max: 6TB RAM per host
Max: 2048 virtual disks per host
Max: 256 Luns or mount points

Remember, right now you have to create a LUN (or volume) configure it with your size, replication schedule, snapshots, dedup, compression, backups, etc. And anything on that LUN/Volume is forced to those attributes
AND vSphere does not know about most of them unless it is available through Vsphere Storage APIs for Array Integration (VAAI), but that really only helps with clones and vmotions

With VVOLS, I have my entire array, and I can create a single storage container (SC), create a single virtual datastore, then using my Storage Policy Based Management (SPBM) I can put all my VMs
Inside the same virtual datastore (which is my Storage Container (which is my array)) and have different policies based on my requirements for VMs

caching (size, enabled/disabled)
auto teiring (enabled/disabled, amount of data, how often to move)
RAID level (RAID level of underlying storage group)
drive type (SSD, magnetic, 15k, 10k, near line)
encryption (type, enabled/disabled)
deduplication (enabled/disabled)
compression (level, enabled/disabled)
replication (replication time, Max RPO, enabled/disabled)
snapshots (periodic automated snapshots, retention, location, array based snapshots enabled/disabled)
write latency (min/max)
read latency (min/max)
write IOPs (min/max)
read IOPs (min/max
space reclamation (unmap enabled/disabled, how often to run)
virtual copy (array based virtual copy enabled/disabled)
thin/thick provisioning (default format, forced format)
backup configuration (backup policies, how often backups ran, retention policies)
Quality of Service (QoS) (which VMs get priority)

Compliance based SPBM

- Cache
- ✓ Auto Tiering
- RAID level
- Drive Type
- ✓ Encryption
- De-duplication
- Compression

- ✓ Replication
- ✓ Snapshots
- Write Latency
- Read Latency
- Write IOPS
- Read IOPS

- Space Reclamation
- Virtual Copy
- Thick/Thin Provisioning
- ✓ Backup
- Quality of Service
- Multi-tenancy

We can make policy using Storage Policy Based Management (SPBM) where auto-tiering is enabled, encryption is enabled, snapshots are set to once every 2 hours with a retention policy of 48 hours
We replicate everything to secondary site with a recovery point objective (RPO) of 4 hours, we require backups to occur nightly with retention of 2 years

Performance based SPBM

- ✓ Cache
- ✓ Auto Tiering
- • RAID level
- ✓ Drive Type
- • Encryption
- ✓ De-duplication
- ✓ Compression

- ✓ Replication
- • Snapshots
- ✓ Write Latency
- ✓ Read Latency
- ✓ Write IOPS
- ✓ Read IOPS

- • Space Reclamation
- • Virtual Copy
- • Thick/Thin Provisioning
- ✓ Backup
- • Quality of Service
- • Multi-tenancy

We can make another policy using Storage Policy Based Management (SPBM) where cache is enabled and allow to use up to 50GB of the cache in the array, auto-tiering is disabled, drive type is SSD, de-dupe enabled, compression enabled, write max latency set to 5ms, read latency set to 5ms, write iops min set to 250, max set to 50000, read iops min set to 250 and max to 50000, backups occur every 6 hours and kept for a month, replication occurs with an RPO of 15 minutes

Test/Dev Policy

- ✓ Cache
- ✓ Auto Tiering
- • RAID level
- ✓ Drive Type
- • Encryption
- ✓ De-duplication
- ✓ Compression

- ✓ Replication
- • Snapshots
- • Write Latency
- • Read Latency
- ✓ Write IOPS
- ✓ Read IOPS

- • Space Reclamation
- • Virtual Copy
- • Thick/Thin Provisioning
- ✓ Backup
- • Quality of Service
- • Multi-tenancy

Our last policy example using Storage Policy Based Management (SPBM) with write cache disabled, auto-tiering disabled, drive type set to SATA drives, de-dup enabled, compression enabled, replication disabled,
Write iops min 50 max 150, read iops min 50 max 150, backups to occur daily and kept for 1 week
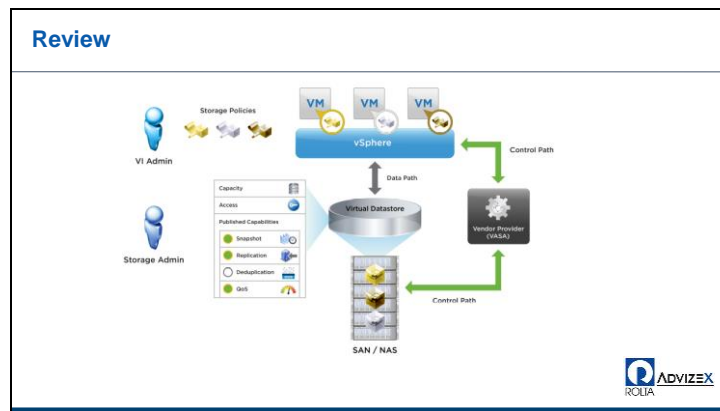
Remember we now have a single virtual datastore. So all of the features we are used to still work. Have a VM has some new business requirements? Perform a storage vMotion and just select the new policy.
Have a file server VM that needs some more disk space, right click on it, edit settings, and change the size of the disk (up to 62TB)
Network is going to be undergoing maintenance and lose half the bandwidth? Edit your policies to change the replication schedule.

You can migration between traditional VMFS and Vvols too

Virtual Volumes (VVol)
Vendor Provider (VP)
VMware APIs for Storage Awareness (VASA)
Protocol Endpoint (PE)
Storage Containers (SC)
Storage Policy Based Management (SPBM)
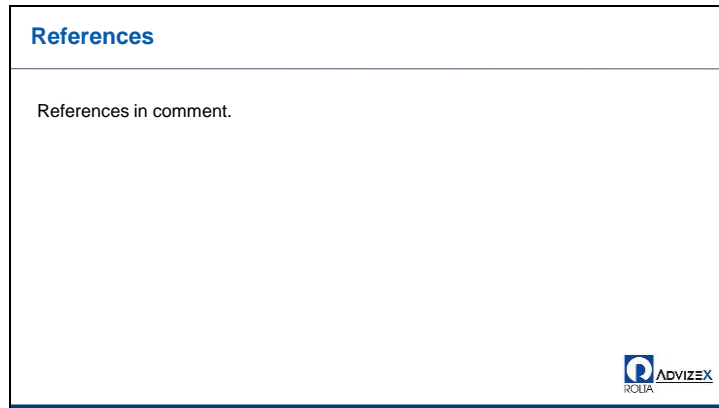Vsphere Storage APIs for Array Integration (VAAI)

Thank you

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