LHC2424BE

200 to 40,000 VMs in 24 Months: Building Highly Scalable SDDC on Hybrid Cloud: Real-World Example

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Tim Jabaut, Staff Solutions Architect - VMware
Disclaimer

- This presentation may contain product features that are currently under development.
- This overview of new technology represents no commitment from VMware to deliver these features in any generally available product.
- Features are subject to change, and must not be included in contracts, purchase orders, or sales agreements of any kind.
- Technical feasibility and market demand will affect final delivery.
- Pricing and packaging for any new technologies or features discussed or presented have not been determined.
Meet your Speakers

Ahmed Abro

VMware Staff Solution Architect
Currently embedded with Accenture for VMware solution stack for private & hybrid cloud.

Author of two books on SDN, multiple drafts and research papers for IEEE and IETF.
Married since 10 years and have 2 young ones.

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Tim Jabaut

VMware Staff Solution Architect
Current Role is as an Embedded Architect with IBM in all of their Repeatable Reference Architecture offerings involving Cloud and VMware.

I currently reside in Raleigh North Carolina with my beautiful wife of 18 years and 2 teenage children that keep us extremely busy with football and soccer.

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Let's set the stage

- **What is this session**
  - Technical walkthrough of a real world hybrid cloud case study
  - High level design discussion
  - Real world challenges and potential solutions
  - Lessons Learned

- **What it's not**
  - Sales pitch
  - Hybrid cloud training
  - Product design
  - Hands-on

Please hold all questions until the end.
Overview
Our Customer

Large US Nationwide Health Insurance Company

- **Millions** of registered policy holders
- Annual Revenue in the **billions**
- Employees **over 100,000**

Services

Provide quality health care at a reasonable cost to subscribers. Handles the delivery, financing and administration of health care service.
Current State

90% Virtualized

- Aging Vblock infrastructure
- Running out of capacity
- Expansive to refresh and maintain
- Not agile enough
- Hard to scale

3 Regions, 2 US Data Centers

vSphere
SAN Storage
The First Step on the Journey

Legacy vBlock Data Center

VM
VIRTUAL MACHINES
STORAGE

On-Prem SSO Domain

L2 Bridging

IBM Cloud Data Center

VM
VIRTUAL MACHINES
STORAGE

REPLICATE
VMOTION

IBM Cloud Data Center

VM
VIRTUAL MACHINES
STORAGE

SL Private Network

Backup/Recovery
Failback

IBM Cloud Data Center

Hybrid Cloud SSO Domain
Bluemix Cloud Overview

VMware on IBM Bluemix Cloud

- Streamlines and facilitates VMware deployments from months to minutes
  - Automated approach
- Designed and validated in conjunction with VMware experts
- Scalable and easier to scale and manage using existing VMware tools
Conceptual Design
Extending your data center into the IBM Bluemix Cloud…

Legacy vBlock Data Center

VM
VIRTUAL MACHINES
STORAGE

On-Prem SSO Domain

L2 Bridging

IBM Cloud Data Center

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SL Private Network

Hybrid Cloud SSO Domain

IBM Cloud Data Center

VM
VIRTUAL MACHINES
STORAGE

Backup/ Recover

Failback

20
Datacenter Locations

San Jose

Dallas
IBM Standard Reference Architecture

- IBM Bluemix Cloud uses a VMware certified hardware BoM that ensures consistency.
- We utilize a modular approach so that we can easily calculate and scale.

- A standard building block of at least (4) Hosts in a “collapsed cluster” model provides for a fully HA Cluster supporting approximately 200 VM’s.

- Conservative Overcommit Ratio
  - vCPU:pCPU = 6:1
  - vRAM:pRAM = 1.3:1

- Reference VM:
  - 2 vCPU
  - 8GB RAM

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**ESXi Host**

<table>
<thead>
<tr>
<th>RAM</th>
<th>512GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk Controller</td>
<td>Avago 9361-8i</td>
</tr>
<tr>
<td>Boot Disk</td>
<td>2 x 1TB SATA (OS)</td>
</tr>
<tr>
<td>Network</td>
<td>Quad 10G NIC – RSS &amp; TSO Support</td>
</tr>
</tbody>
</table>

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200 VM’s Achieved
That feeling when you achieve your goal, only to have the customer come back with:

"That’s great, now let’s go to 40,000 VM’s in 24 months.”
Changing Requirements leads to a change in Approach
Deployment Timeline

Number of VM's Deployed

- 1,700 VMs Per Month
- Approx 9 Building Blocks (~36 Hosts)

Number of VM's Deployed
Lets do the math

On-Prem Staging 2,000

Test/Dev/ QA 12,000

Production 13,000

DR 13,000

= 40,000
# Workload Tiering Chart

<table>
<thead>
<tr>
<th>Tier</th>
<th>Application Class</th>
<th>Total Workloads</th>
<th>Tier Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier-0</td>
<td>Mission Critical</td>
<td>2000</td>
<td>0 Data Loss – Synchronous Replication/Clustering</td>
</tr>
<tr>
<td>Prod Hi Tier</td>
<td>Business Critical</td>
<td>4000</td>
<td>RPO 1hr/RTO 8hr vSphere Replication/SRM</td>
</tr>
<tr>
<td>Prod Low Tier</td>
<td>Secondary Applications</td>
<td>9000</td>
<td>RPO 24hr/RTO 72hr Array Based Mirroring</td>
</tr>
<tr>
<td>Non-PROD</td>
<td>No Tiering</td>
<td>12000</td>
<td>No BC/DR</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>27000</td>
<td>+ 13000 DR Workloads</td>
</tr>
</tbody>
</table>
Extending your data center into the IBM Bluemix Cloud...

- Virtual Machines
- Storage

Legacy Vblock Data Center

VMotion

VMotion

Secure Dedicated Link

IBM Private Network

IBM Cloud Data Center San Jose

IBM Cloud Data Center Dallas

L2

Vblock SSO Domain

On Prem
Logical Workload Breakdown

- PROD-HiTier workloads rely on SRM/vSphere Replication. This imposes a 2000 VM limit per vCenter
- PROD-LowTier will utilize Endurance Storage Mirroring to satisfy RPO/RTO
- NON-PROD has no BC/DR component
Migrate Workloads to the Cloud

Migration from the Vblock Environment to the On-Prem Staging Environment will be accomplished by vMotion and svMotion.

When placed in the Staging Environment, VM’s need to be Replicated to the Cloud Environment.

As we procure hosts over time, we rebalance workloads to keep even asset utilization for proper capacity planning.

Additionally Site Recovery Manager can orchestrate the replication and migration into the Cloud Environment.
Moving Workloads Within the Cloud

Workloads can be migrated from Staging On-Prem to SJC DC

Workloads can be vMotioned between Cloud DCs (This is how we balance workloads)

Replication is not enabled between staging and DAL DC
Component Level Design

On-Prem
- On-Prem Mgmt Cluster (4 Hosts)
  - vCenter Mgmt-On-Prem-01
  - vCenter Wrk-On-Prem-01
- NSX Manager Wrk-On-Prem-01 (Primary)
- On-Prem Compute Cluster 1 (18 Hosts)
- On-Prem Compute Cluster 2 (18 Hosts)
- SAN Storage

SJC DC
- SRM Protected Site (SJC) Management Cluster (4 Hosts)
  - vCenter Mgmt-SJC-01
  - NSX Secondary
  - vCenter Wrk-SJC-01
  - NSX Secondary
  - vCenter Wrk-SJC-02
  - NSX Secondary
  - vCenter Wrk-SJC-03
- Compute Cluster
- Rep App

DAL DC
- SRM Recovery Site (DAL) Management Cluster (4 Hosts)
  - vCenter Mgmt-DAL-01
  - NSX Secondary
  - vCenter Wrk-DAL-01
  - NSX Secondary
  - vCenter Wrk-DAL-02
- Compute Cluster

Hybrid Cloud SSO Domain
- Universal NSX Controllers
- Rep App
- Mirror
- Endurance Storage

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Physical Network to Hybrid Cloud

**SoftLayer POD**

**Bare Metal ESXi Host**

- eth-0
- eth-2

**Private VDS**

- VLAN 1140 | ESXi MGMT & vMotion VMK
  Portable Subnet 10.255.248.48/26
- VLAN 1324 | vSAN VMK VLAN
  Portable Subnet 10.255.248.64/26
- VLAN 1452 | VXLAN VTEP VMK
  Portable Subnet 10.255.248.80/26

**Public VDS**

**Private VLAN Boundary**

ETHERNET POD Infrastructure

- BCS/BAS
- BCR
- MBR

**SL POD**

**Backend Customer Routed Network**

**ESXi Host**

- eth-0
- eth-2

**Private VDS**

**Backup ESXi Host**

- eth-2
- eth-0
- eth-1
- eth-3

**VLANs Trunked to eth-0 & eth-2**

**On-Premise**

**SL Backbone**

**NPOP**

**SL Direct Link**

**SL Assigned IP Address**

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Multisite Bluemix Networking for Hybrid Cloud

On-Prem

Bluemix – SJC

Universal Distributed Logical Router (UDLR)

Universal Transit VXLAN Uplinks

Web - VXLAN 900010 - 192.168.10.0/24

App - VXLAN 900020 - 192.168.20.0/24

DB - VXLAN 900030 - 192.168.30.0/24

NSX ESG

CE

10G Circuit

XCR  BBR  DAR  MBR  BCR

NSX ESG
Logical Network for Bluemix DR

U-DLR Control VM

Allow prefix list: Web, App, DB Subnet

Deny prefix list: Web, App, DB Subnet

Protected

Active N-S

Stand-by N-S

Recovery

SRM

Universal Control VM

BGP

Universal Logical Switch

Web U-LS

App U-LS

DB U-LS

U-DFW

U-DFW

U-DFW

U-DFW

Web

App

DB
Execution
Scalable Hybrid Cloud Maturity Model

Automate it

Scale & Protect it

Build it

vRealize Automation & Orchestration

vSphere Replication, SRM

vSphere, NSX, IBM Endurance
Lesson Learned

• Lack of overall vision led to changing solutions on the fly
• Lack of complete requirements led to a lost time and productivity to make a complete solution
• Customers requirements put substantial constraints on the resulting design. Not always the best approach, but a valid approach none-the-less
• Stable Common Services cannot be overlooked. DNS, NTP, Certificate Services need to be consistent, reliable and stable
• Need careful planning especially with BYOIP
Just Announced VMware HCX

• Extend your Datacenter into the cloud
• Ability to Migrate VM’s of differing versions
• DR to the Cloud

For more information goto: https://cloud.vmware.com/vmware-hcx
Please fill out your survey.

Take a survey and enter a draw for a VMware company store gift card.