

GLCG Deployment Architecture using HPE SimpliVity 380 (master copy)

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Revision history

Revision	Author	Date	Description
0.25	Jyoti Ranjan	25-June-2019	Conceptualized the content
0.35	Jyoti Ranjan	26-June-2019	Added deployment architecture
0.5	Jyoti Ranjan	26-June-2019	Added recommended configuration
0.75	Jyoti Ranjan	27-June-2019	Made multiple changes: deployment architecture, high availability architecture, advantages etc
0.85	Jyoti Ranjan	27-June-2019	Detailed other option of deployment architecture where vCenter high availability is supported
1.0	Jyoti Ranjan	01-July-2019	Added one more architecture option where we do maintain two HPE SimpliVity 380 cluster but of different size
1.1	Jyoti Ranjan	04-July-2019	Added architecture diagram where customer brings vCenter and Arbiter.
1.2	Jyoti Ranjan	16-July-2019	Added architecture diagram where vCenter is deployed in OmniStack cluster so that vCenter gets high availability as well.

Overview

Introduction

GreenLake Hybrid Cloud (GLHC) cloud platform is a flagship cloud solution provided by HPE. Gemini is one of the product line up which aims to support "VMaaS" offering is to provide customers a public cloud like experience on premise. Managing and operating the VMaaS cloud life-cycle remotely requires a set of services running on-premises and these set of services form the "Green Lake Cloud Gateway (GLCG)". In order to run these set of services as part of the GLCG, a gateway platform needs to be designed.

Purpose

This technical white paper reviews the features and benefits of HPE SimpliVity hyper converged infrastructure and describes the hardware and software components and subsystems that make up the gateway platform using HPE SimpliVity. Particular attention is given to the native composition of infrastructure needed to deploy gateway. It does not address comparison of HPE SimpliVity other way to realize gateway. For details on evaluation criteria for other choices, please refer [Green Lake Cloud Gateway \(GLCG\) proposal for physical infrastructure](#).

Why HPE SimpliVity?

HPE SimpliVity 380 is hyperconverged infrastructure, available on HPE ProLiant DL380 Servers, is a compact, scalable, 2U rack-mounted building block that delivers server, storage, and storage networking services. It provides increased efficiency, management, and data protection demands of today's data-intensive, highly virtualized IT environments. The HPE SimpliVity solution provides a scalable, modular, 2U building block of x86 resources that offers all the functionality of traditional IT infrastructure—in one device. It assimilates storage; compute; hypervisor; and real-time deduplication, compression, and optimization; along with comprehensive data management, data protection, and disaster recovery capabilities. The usage of HPE SimpliVity 380 on ESX brings converged benefits of ProLiant server, VMware solutions and Efficient data management platform of HPE SimpliVity from the perspective of GLCG.

Deployment architecture

Core components

It is important to touch base on the elements collaborating in architecture realization of GLCG using HPE SimpliVity.

Entity	Purpose	Infrastructure requirement
HPE SimpliVity OmniStack Host	It is used to form a high available cluster. Each host comes with the following pre-installed software: HPE OmniStack and HPE SimpliVity vStorage APIs for Array Integration (VAAI)-network-attached storage (NAS) plug-in.	<ul style="list-style-type: none">HPE SimpliVity 380 hosts. Possible size: XS, S, L.Maximum 16 HPE OmniStack hosts per cluster (very well under limit of GLCG gateway requirement)All hosts should have same ESXi versionAll hosts should have same OmniStack version
Deployment Manager	It is a stand-alone Windows application that configures and deploys HPE OmniStack hosts in an existing cluster.	<ul style="list-style-type: none">Windows operating systems (Windows 7)
Arbiter	It is windows application. Enables communication between OmniStack and vCenter Server and is used to preserves the health of the federation by acting as an independent witness and providing the tie-breaking vote when a federation contains an even number of HPE OmniStack hosts.	<ul style="list-style-type: none">Windows operating systems (Windows 7)Needed for every cluster and should not be deployed on any HPE SimpliVity OmniStack host or data store being observed by it.Commonly installed on the vCenter ServerVersion of Arbiter should match the version of HPE OmniStack used by your hostsRecommended to use one arbiter per 4096 VMs (very well under limit of GLCG gateway requirement)
vCenter Server	Used to manage VMware infrastructures	<ul style="list-style-type: none">It should not be deployed on OmniStack host.Do not get confused with article which talks about deploying vCenter Server on HPE SimpliVity cluster. Those vCenter server are meant to use other OmniStack cluster.
vSphere HA solution	Provides high availability of virtual machines.	<ul style="list-style-type: none">No specific infrastructure requirement.vMotion should be enabled
vSphere web client plugin	It allows to manage your HPE SimpliVity virtual inventory objects across the entire HPE SimpliVity federation using HPE SimpliVity features.	<ul style="list-style-type: none">No specific infrastructure requirement.The feature should be enabled with vCenter web client

Availability of vCenter and Arbiter

The proposal is very much dependent upon how we do see facilitation of vCenter and Arbiter. These are choices:

1. Deployment architecture where customer is accountable for providing vCenter and Arbiter

2. Deployment architecture where vCenter and Arbiter as singleton instance but without high availability
3. Deployment architecture where vCenter and Arbiter as two instance but in active-passive mode for high availability
4. Deployment architecture where vCenter and Arbiter are in respective VMs backed by hypervisor high availability

Deployment architecture diagram

There are following choices we have here based on whether we need high availability for vCenter server or not,

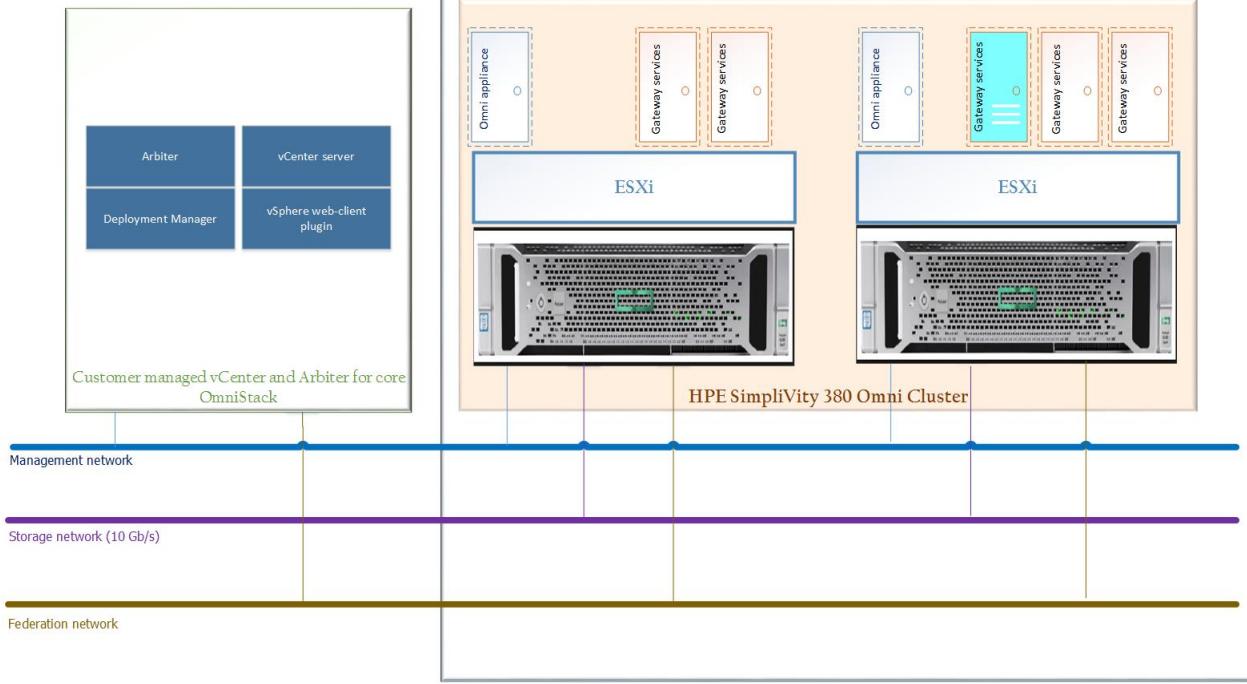
ID	Choices	Description
1	Deployment architecture where customer is accountable for providing vCenter and Arbiter	<ul style="list-style-type: none"> • Single OmniStack cluster • Customer is responsible to provide vCenter and Arbiter • $2 \times 2 = 4U$ rack space • Low cost and less rack space
2	Deployment architecture with least hardware footprint	<ul style="list-style-type: none"> • Single OmniStack cluster • vCenter HA is not supported • $2 \times 2 + 1 = 5U$ rack space • Low cost and less rack space
3	Deployment architecture with vCenter HA but deployed in ESXi pool	<ul style="list-style-type: none"> • One OmniStack cluster + One ESXi node pool • vCenter HA is supported (in active-passive mode). It is going to be tricky as duplication of data can be challenge in real time. • $2 \times 2 + 2 = 6U$ rack space • Marginal increase in cost if compared to first option
4	Deployment architecture with vCenter HA but deployed in independent HPE OmniStack cluster	<ul style="list-style-type: none"> • Two OmniStack cluster of different size (Medium + Extra small) • vCenter HA is supported by leveraging native HA of hypervisor cluster • $2 \times 2 + 2 \times 2 = 8U$ rack space • Marginal increase in cost if compared to second option but with no effort for automation

Deployment architecture where customer is accountable for providing vCenter and Arbiter

In this case, customer is responsible for providing vCenter and Arbiter so that it can be used for erecting OmniStack. It is up to customer to see whether they need vCenter HA or not. This is the pattern most adapted by native customer of HPE HPE SimpliVity.

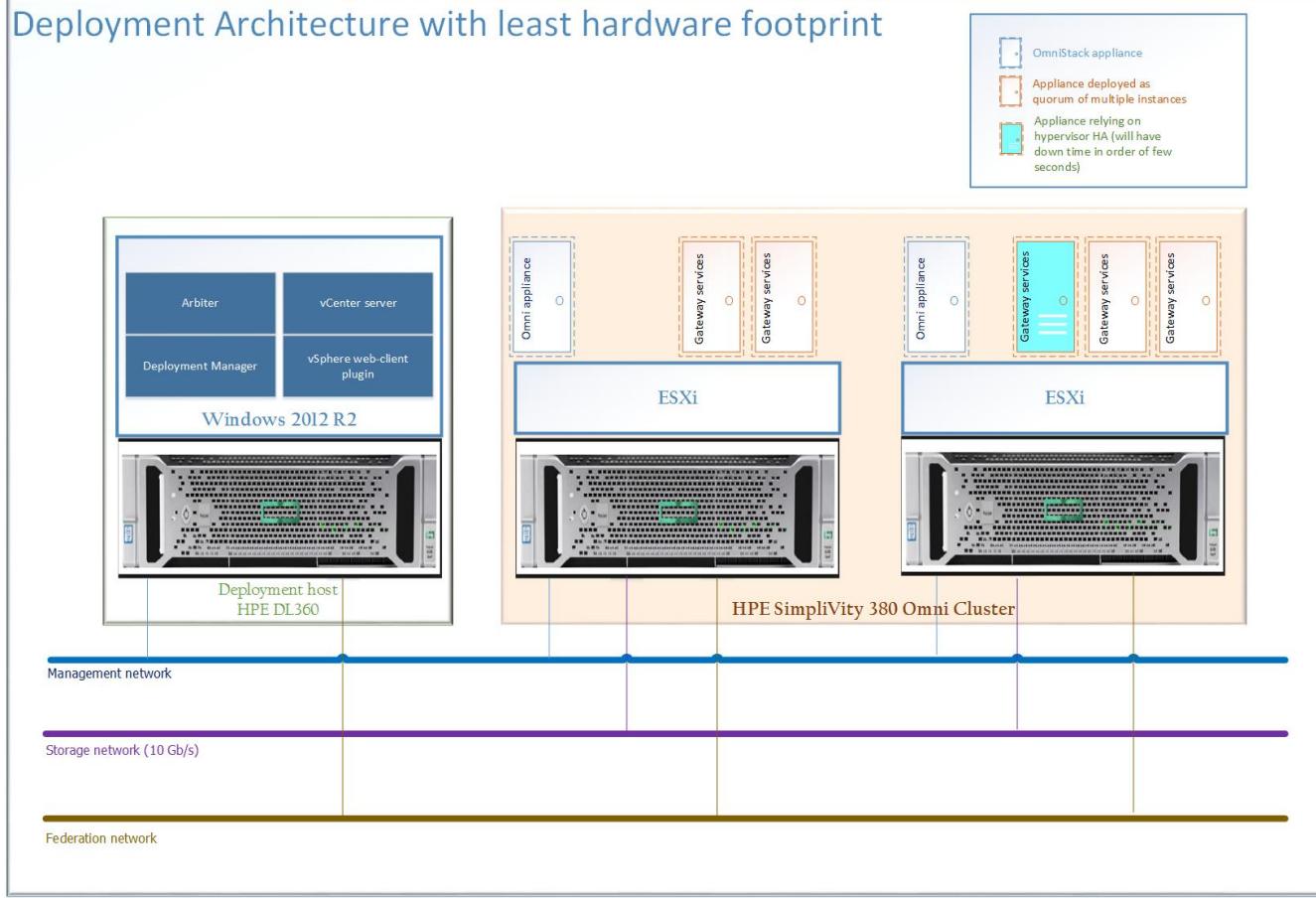
Deployment Architecture with customer managed vCenter and Arbiter

 OmniStack appliance
 Appliance deployed as quorum of multiple instances
 Appliance relying on hypervisor HA (will have down time in order of few seconds)



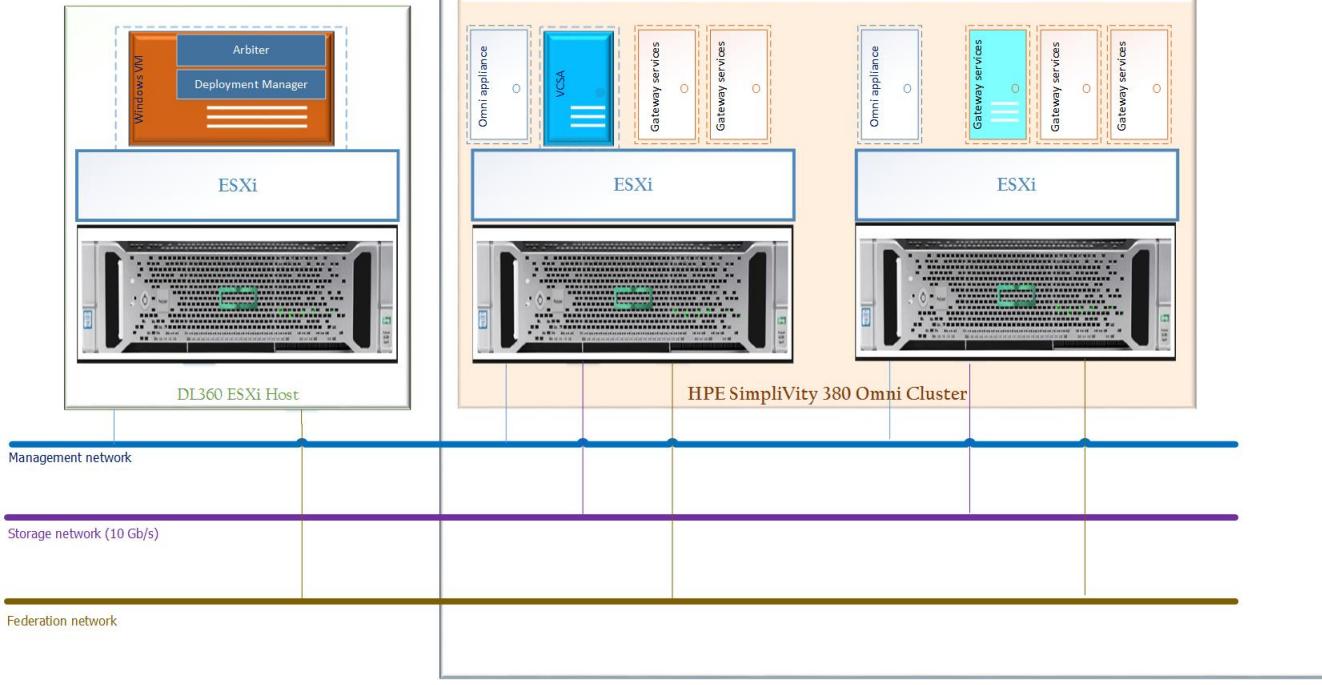
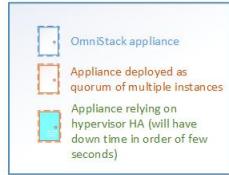
Deployment architecture with least hardware footprint

Deployment Architecture with least hardware footprint



Deployment architecture with vCenter HA but vCenter running in OmniStack cluster only

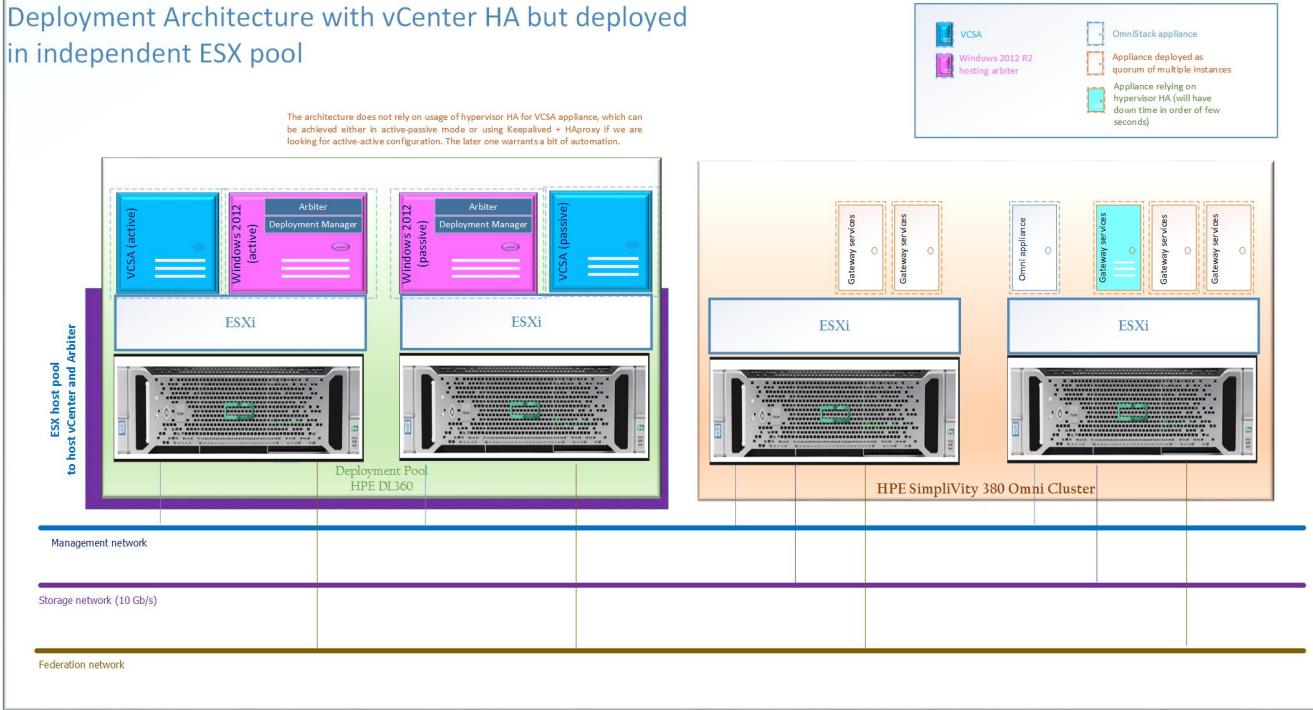
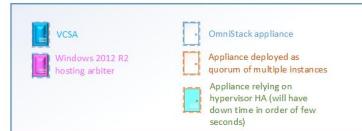
Deployment Architecture with vCenter inside HPE SimpliVity cluster



Deployment architecture without vCenter HA but deployed in independent ESXi pool

Deployment Architecture with vCenter HA but deployed in independent ESXi pool

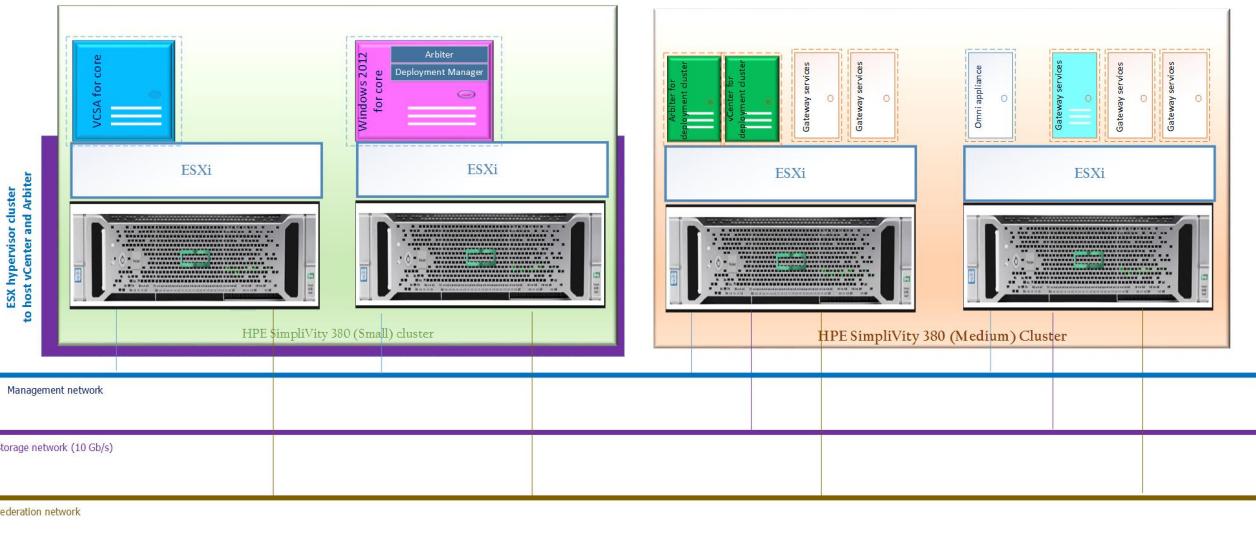
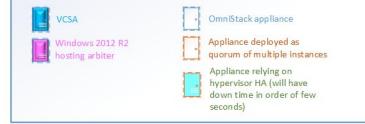
The architecture does not rely on usage of hypervisor HA for VCSA appliance, which can be achieved either in active-passive mode or using Kepalived + HAProxy if we are looking for active-active configuration. The latter one warrants a bit of automation.



Deployment architecture with vCenter HA but deployed in independent HPE SimpliVity OmniStack cluster

Deployment Architecture with vCenter High Availability using hypervisor cluster

The architecture does not rely on usage of hypervisor HA for VCSA appliance realized using smaller footprint of HPE SimpliVity 380



System configuration

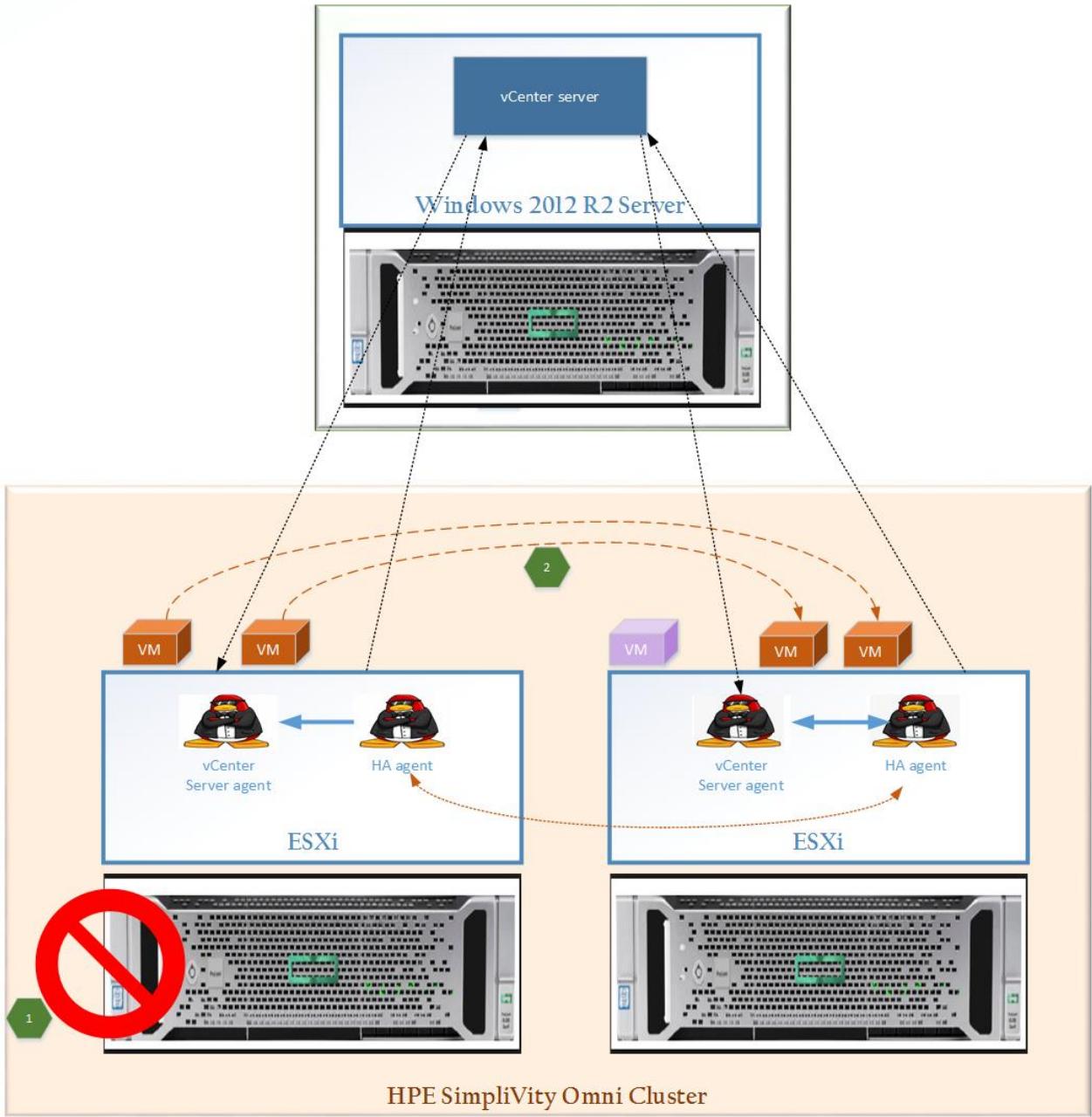
Aspects	HPE SimpliVity 380 <u>with</u> vCenter HA but deployed in independent ESXi pool	HPE SimpliVity 380 <u>with</u> customer provided vCenter HA and Arbiter	HPE SimpliVity 380 <u>with</u> customer provided vCenter deployed inside OmniStack cluster	HPE SimpliVity 380 <u>with</u> vCenter HA but deployed in independent OmniStack cluster	HPE SimpliVity 380 <u>without</u> vCenter HA with least hardware footprint
Hardware	<ul style="list-style-type: none"> 2 HPE SimpliVity 380 (size: Medium) for OmniStack <ul style="list-style-type: none"> Usable storage capacity per two node cluster: ~15 TB Form factor 2x2U = 4U 2 HPE Proliant DL360 Gen 10 for ESXi hypervisor cluster <ul style="list-style-type: none"> VCSA (appliance mode) Arbiter is installed on Windows 2012 R2 VM 4 LFF SATA disk should be good enough for local storage with the usage of RAID 10. Usable storage capacity: $(3 \text{ TB} * 2 * 2) / 2 = 6 \text{ TB}$ (without deduplication) Form factor 1U + 1U = 2U 	<ul style="list-style-type: none"> Single OmniStack cluster with 2 HPE SimpliVity 380 (size: Medium) <ul style="list-style-type: none"> Usable storage capacity per two node cluster: ~15 TB Form factor 2x2U = 4U Customer is responsible to provide vCenter and Arbiter. Network connectivity is expected. 	<ul style="list-style-type: none"> 2 HPE SimpliVity 380 (size: Medium) for OmniStack <ul style="list-style-type: none"> Usable storage capacity per two node cluster: ~15 TB Form factor 2x2U = 4U 1 HPE Proliant DL380 Gen 10 Server 5 for Arbiter and management software (term it as Deployment host). <ul style="list-style-type: none"> vCenter is deployed on Windows host directly 4 LFF SATA disk should be good enough for local storage with the usage of RAID 10. Usable storage capacity: $(3 \text{ TB} * 4) / 2 = 6 \text{ TB}$ (without deduplication) Form factor 1x1U = 1U 	<ul style="list-style-type: none"> 2 HPE SimpliVity 380 (size: Medium) for core OmniStack cluster <ul style="list-style-type: none"> Usable storage capacity per two node cluster: ~15 TB Form factor 2x2U = 4U 2 HPE SimpliVity 380 (size: Extra small) for vCenter HA <ul style="list-style-type: none"> VCSA (appliance mode) Arbiter is installed on Windows 2012 R2 VM Usable storage capacity per two node cluster: ~4 TB Form factor 2x2U = 4U 	<ul style="list-style-type: none"> 2 HPE SimpliVity 380 (size: Medium) for OmniStack <ul style="list-style-type: none"> Usable storage capacity per two node cluster: ~15 TB Form factor 2x2U = 4U 1 HPE Proliant DL380 Gen 10 Server 5 for Arbiter and management software (term it as Deployment host). <ul style="list-style-type: none"> vCenter is deployed on Windows host directly 4 LFF SATA disk should be good enough for local storage with the usage of RAID 10. Usable storage capacity: $(3 \text{ TB} * 4) / 2 = 6 \text{ TB}$ (without deduplication) Form factor 1x1U = 1U

Software	<ul style="list-style-type: none"> • OmniStack cluster • Deployment host pool <ul style="list-style-type: none"> • Windows 7 or Windows Server 2012 R2. • Arbiter • vSphere vCenter server 6.5 or vCenter Server Appliance 6.0 or 6.5 • Deployment manager • We will get HA in active-passive configuration. 	<ul style="list-style-type: none"> • OmniStack cluster • Deployment host pool <ul style="list-style-type: none"> • Windows 7 or Windows Server 2012 R2. • Arbiter • vSphere vCenter server 6.5 or vCenter Server Appliance 6.0 or 6.5 • Deployment manager • Customer needs to provide vCenter and Arbiter 	<ul style="list-style-type: none"> • OmniStack cluster • Deployment host <ul style="list-style-type: none"> • ESXi host • Windows 7 or Windows Server 2012 R2 VM • Arbiter • vCenter Server Appliance 6.5 • Deployment manager 	<ul style="list-style-type: none"> • OmniStack cluster • Deployment host <ul style="list-style-type: none"> • Windows 7 or Windows Server 2012 R2. • Arbiter • vSphere vCenter server 6.5 or vCenter Server Appliance 6.0 or 6.5 • Deployment manager
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Illustration of functioning of high availability of GLCG services

Realization of high availability in HPE SimpliVity 380

 Flow of VM migration on
Omni host failure



Recommendation

Based on the above analysis, Its recommended to go with one of the following options:

1. Deployment architecture where customer is accountable for providing vCenter and Arbiter

2. Deployment architecture with vCenter HA but vCenter running in OmniStack cluster only

Author proposes for point (2) though (1) as it is most common deployment used by native customer of HPE SimpliVity 380. It is because Agena aims to automate the workflow as much as possible. It is worth to mention that deploying vCenter in OmniStack cluster poses risk of losing if cluster goes offline but it is reasonably acceptable.

Salient points of core OminStack are:

- Usage of proven technology: HPE Proliant servers, HPE SimpliVity and VMware.
- High availability for vCenter as well as Arbiter
- High availability for services running in gateway to host on-prem core services
- Simplified life-cycle manageability
- Efficient data storage platform
- Easy manageability, supportability and operability

Appendix

HPE SimpliVity 380 storage features

Storage aspect	HPE SimpliVity 380 Medium
Can be used as hyper-converged storage system?	Yes
Storage capacity	~ 15 TB
Fault tolerance	Mirroring
Storage protocol meaningful for gateway	NFS
Thin provisioning to leverage consume bits as you need	Yes
Scalability	Horizontally scalable
Compression	Yes
Deduplication	Yes
Backup	Yes
Disaster recovery	Yes
Performance	Very good
Manageability	Easy
Telemetry	Very good

Pros and Cons of HPE SimpliVity

Aspects	Pros	Cons
System hardware and software	<ul style="list-style-type: none">• Low hardware footprint. Only 3 physical servers are needed.• Powered by HPE SimpliVity Accelerator card• Proven Proliant feature<ul style="list-style-type: none">• iLO based server management• Reliable, proven and very engineered feature• Proven ESXi hypervisor and VMware solution	<ul style="list-style-type: none">• Need windows server license• Cost (not too cheap)

Manageability	<ul style="list-style-type: none"> • Ease of day-zero deployment • Easy maintainability (say-n) like upgrade etc. • HPE SimpliVity Upgrade Manager supports upgrade of entire federation with no application downtime • Simplified manageability using vSphere web client • Extended simplified manageability of HPE SimpliVity resources using HPE SimpliVity extension 	None
Feature	<ul style="list-style-type: none"> • Optimized storage • Highly efficient data storage platform based on destination level deduplication and compression • Best in class supportability of backup and disaster recovery, • Hyper-visor level high availability 	None
Tangible aspects	<ul style="list-style-type: none"> • Usage of HPE family of product 	None