GLCG Proposal for service's high availability

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Revision history

Revision	Author	Date	Description
0.1	Jyoti Ranjan	16-June-2019	Conceptualized the content
0.5	Jyoti Ranjan	17-June-2019	Draft proposal on investigation for high availability for services of Gemini Platform Gateway
1.0	Jyoti Ranjan	24-June-2019	Refactored the proposal to consider high availability of services running insider appliance or high availability of appliance. It has been agreed that we will not be running services on baremetal

Overview

The Agena's cloud gateway is a crucial component facilitate various aspects of private VMaaS cloud and connectivity to cloud using SaaS portal located in AWS. The expectation is that any service deployed on gateway should be highly available and should be designed to continue to function normally even when there are failures within the system which can be NIC failure or software failure or hardware failure etc. The desired tenet of solutions are: almost ZERO DOWNTIME for maintenance activities like service patching/upgrades, configuration which need service restart etc.

- Automatic Fail over.
- Easy to setup and manage.
- Low TCO (total cost of ownership)

There are many ways to achieve the goal with the promise of ability to tolerate SPO (Single Point of Failure) as listed below with varying degree of availability expressed in 9s..

1. Gateway services directly on physical baremetal and make service highly available. Or,
2. Gateway services deployed as appliance - some services of appliance might be designed to be high available while some will rely on high availability of appliance supported through hyper visor infrastructure. Or,
3. A combination of above two.

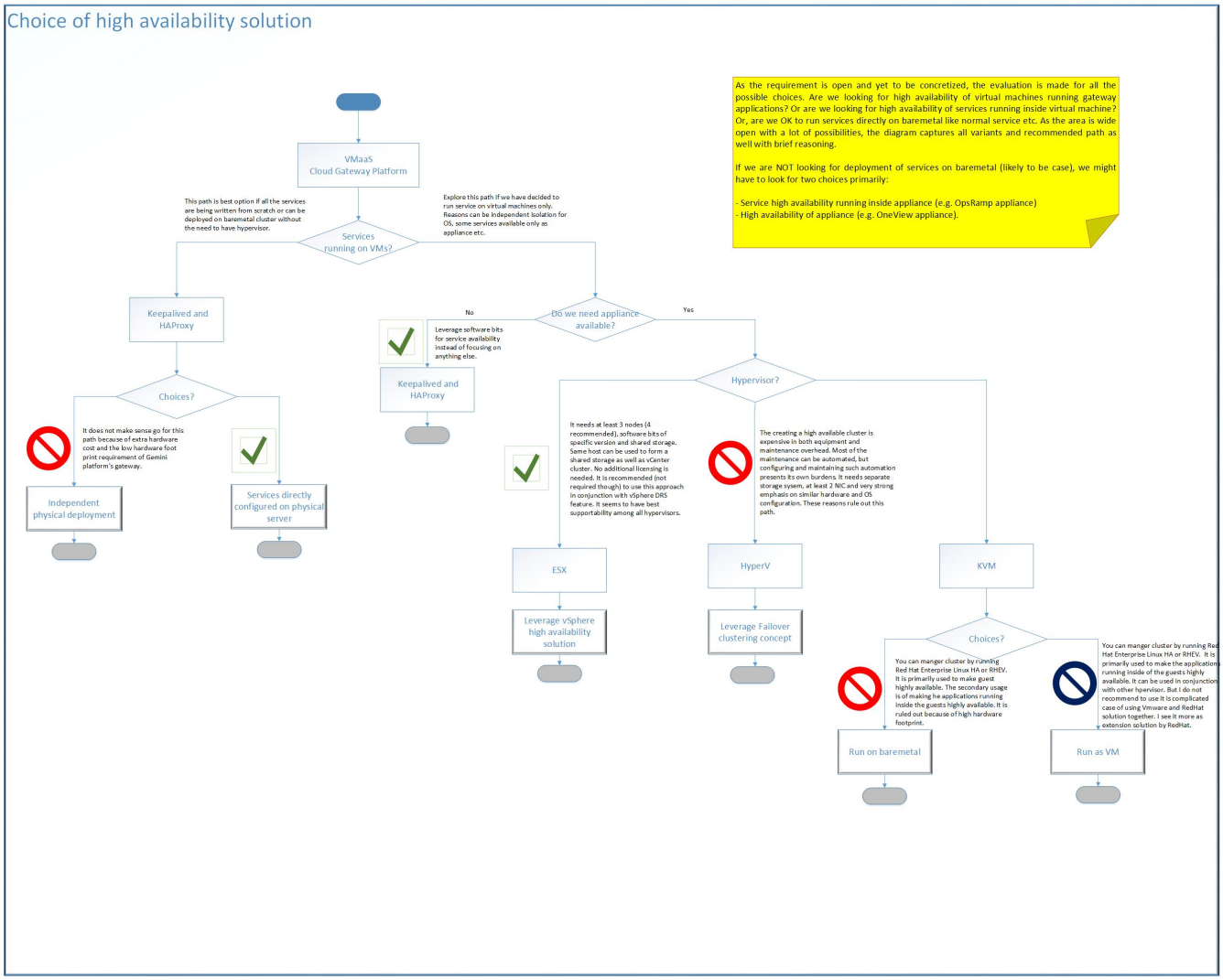
As per author, the intent here is to cover all permutation and combination to bring clarity. It is very likely that choice (2) will be pursued so the proposal puts emphasis on that.

Choice(s)

As the gateway design in under the process of evaluation, the following aspects are not clear. So, the discussion addresses all permutation and combination but converging to 1-2-3 choices only based on evaluation:

- Are we looking for high availability of services only? Can we host them directly on baremetal?
- Are we looking for high availability of virtual machines running services? Reason can be isolated operating system or services being available only as appliance etc.
- Are we going to use KVM or ESX hypervisor?
- Are we looking for combination of more than one choices?

Keeping the above point in mind, the various choices have been explored with author's opinion on recommended path. At the same time, it is anticipated (by author) that we are more likely to use ESX hypervisor where services will be deployed as virtual appliance. Some appliances (e.g. OpsRamp) will support high availability of service natively and hence does not need high availability of appliance supported by hypervisor infrastructure. But, some appliances (e.g. OneView) might need high availability of virtual infrastructure. So, there is specific focus addressing both aspects. See next section(s)!



Usage of vSphere for virtual machine's high availability

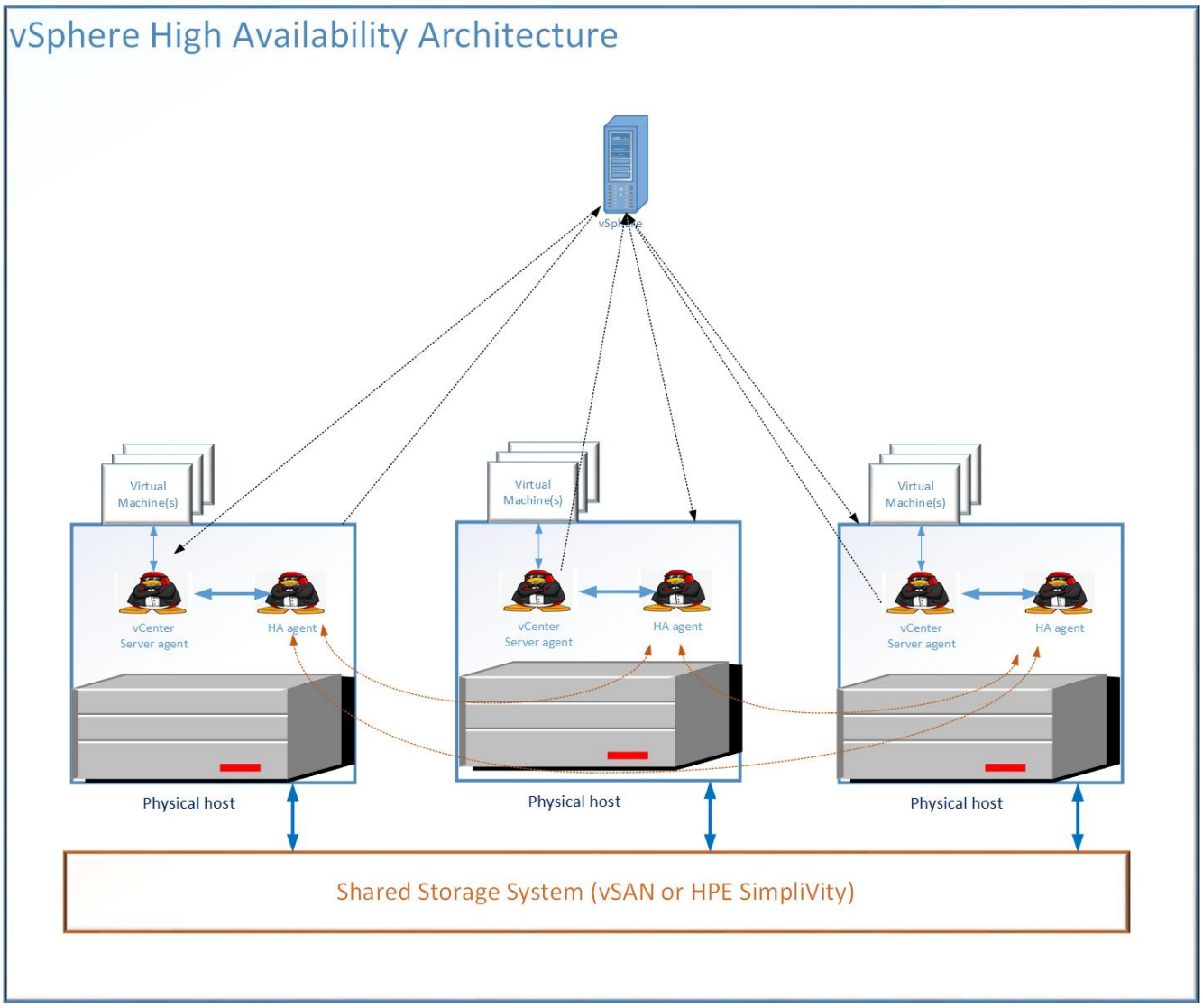
> *Note:*
>
> *This section depicts how high availability of appliances can be realized for virtual appliances hypervisor clustered infrastructure. This mechanism can be used by appliances (e.g. OneView) where services does not support high availability. This section is though focused on assumption of ESX hypervisor (likely to be gateway choice) but similar supports is for other hypervisor with variance in some details.*

This section depicts how high availability can be realized in VMware environment. Some of the requirements are:

- VMware ESXi 5.5 or later.
- At least three hosts are recommended by VMware as this allows each vCenter HA node to run on a different host for better protection
- Need shared storage

- vCenter HA network latency must be less than 10 ms between Active, Passive, and Witness nodes
- VCSA should be of 6.5 or higher.
- vMotion network enabled
- Requires standard license only.

The potential deployment architecture is pictorially represented below.



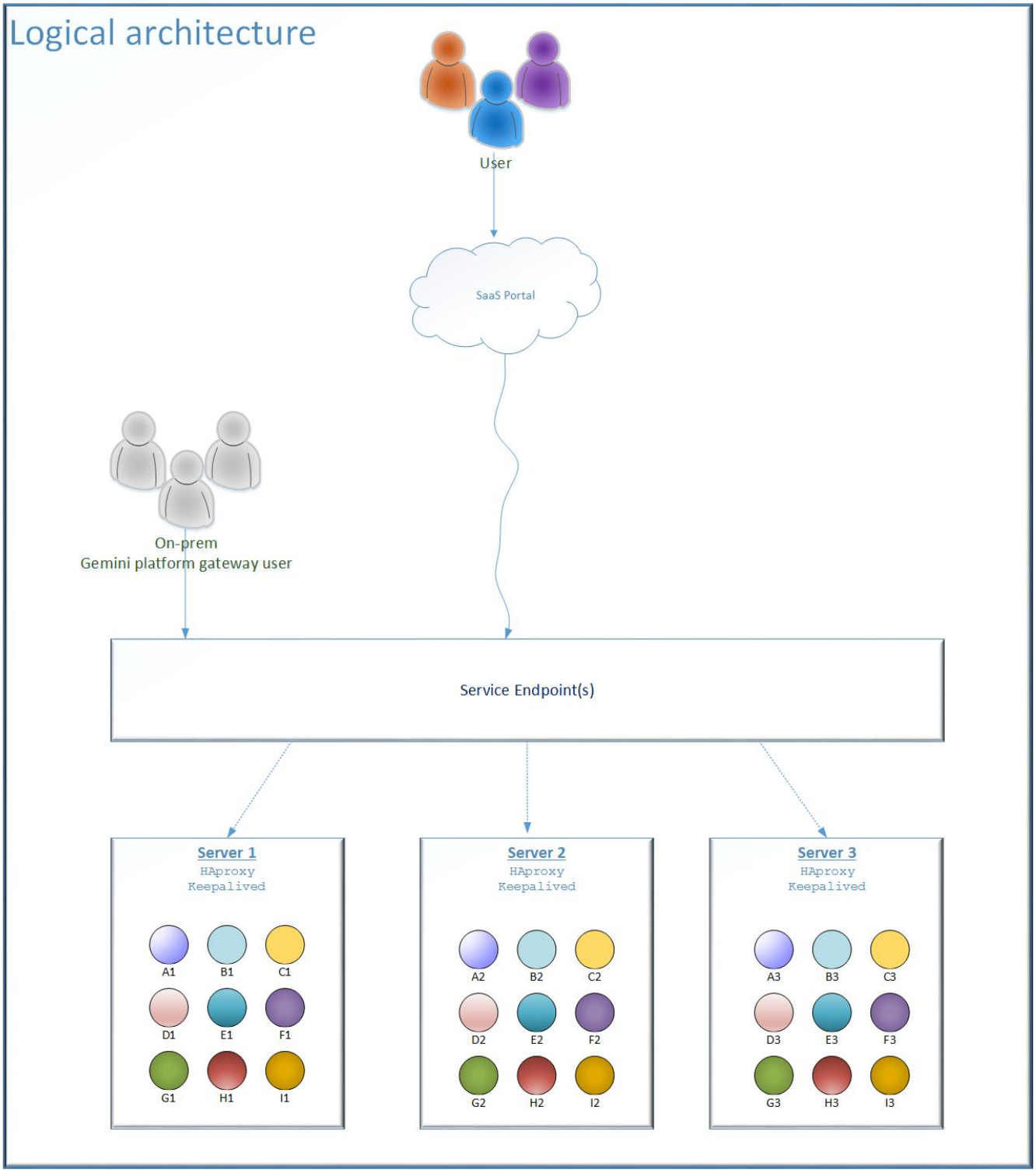
Usage of Keepalived and HAProxy for service high availability

> *Note:*
>
> *This section depicts how high availability of service can be achieved without needing supporting from high availability for hypervisor cluster, The solution suggests to use keepalived and HAproxy to design the high availability of services. We can use keepalived in conjunction with nginx as well but is not explored here. It is because of past experience of HAproxy in other cloud initiatives. It is also lighter than nginx.*

The usage of Keepalived and HAProxy is good choice if we are looking for services high availability as it provides both load balancing as well as high availability without needing much complicated eco-system. This section talks about usage of keepalived and HAproxy in conjunction the services. Some of the content might be obvious (especially to experienced people) but has been drafted here for sake of completeness. Load Balancer is a set of integrated software components that provide for balancing IP traffic across a set of real servers. It consists of two main technologies to monitor cluster members and cluster services: **Keepalived and HAProxy**. The participated entities in this eco-system are:

Keepalived	It does the fail-over job.
HAProxy	It performs load balancing and high-availability services to TCP and HTTP applications.
VIP	Virtual IP addresses (or VIPs) allow you to use multiple IPs on a single physical network interface.

The logical architecture is depicted below.



Recommendation

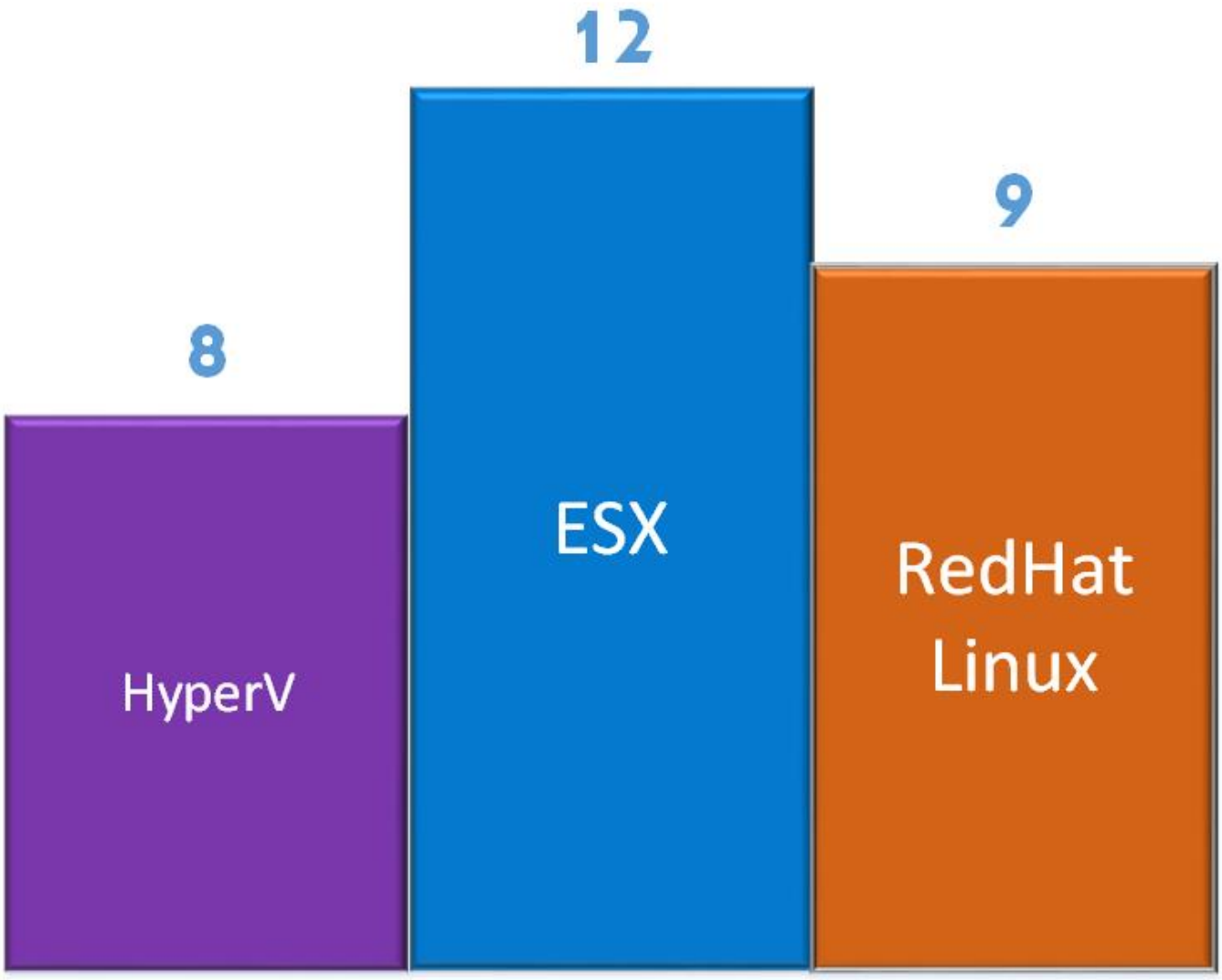
As of now, it is clear that services will be deployed using appliances belonging to two categories:

- Services in appliance (e.g. OpsRamp) does not need high availability support from hypervisor cluster
- Services in appliance (e.g. OneView) need high availability support from hypervisor cluster

Considering the above points, it is prudent to go for high availability support from hypervisor.

	ESX	HyperV	RedHat KVM
Minimal hardware footprint	3	3	3
Belong to HPE or Opensource family of product(s) - helps in branding instead of telling ourselves as VMware shop	0	0	0
Easy to configure and manage high availability (day 1 to day n)	3	2	2
Robustness based on industry wise adoption and self-usage experience	3	1	2
Cost including physical infrastructure and licensing (lower cost, higher point)	3	2	2
Total	**12**	**8**	**9**

The winner is ESX as is depicted below.



Ranks based on point based evaluation

Recommended configuration:

Recommendation	Reasoning
1. Go for vSphere solution to leverage high availability of appliance realized through hypervisor cluster 2. Create 3 node cluster 3. User HPE SimpliVity or vSAN as native shared storage	• VMware leads by a significant margin. HPE being well versed with eco-system. • Better supportability and low maintenance. • Same set of ESX hosts can be leverage to form shared storage as well. vSAN is very well supported. For HPE SimpliVity, we need to double confirm though I do not see any issue.

Conclusion

Recommendation is to leverage high availability support using hypervisor cluster. Considering the robustness, in-house experience, minimum hardware configuration, ease of maintainability and operability etc. we should go for ESX hypervisor.