Challenge 1

Virtual Design Master

Mohamed Ibrahim

1. Table of Contents

2.0 Conceptual Model

The following sections describe the Customer Requirements, Design Constraints and Design Assumptions. The tables below map these into the infrastructure design qualities.

1.1 Solution Requirements

Table 1: Solution Requirements

Reference	Customer Requirement	Design Quality
ALL.R1	Two primary datacenter that will function as active/active which will host all the servers in highly available fashion.	Availability
ALL.R2	There will be another datacenter, which will function as passive and contains entire copy of active datacenters.	Availability
ALL.R3	Solution should leverage FCoE to have converged infrastructure for both Network and SAN traffic	Manageability
ALL.R4	Maximum RTO of business continuity should be 20 mins.	BC/DR
ALL.R5	Application to support 99.99% availability with both local and global resiliency	Availability
ALL.R6	This design must use 40 GB to leverage the FCoE infrastructure	Manageability
ALL.R7	Solution should support to functioning of active/active datacenter	Availability
ALL.R8	Solution should support application deployment	Manageability
ALL.R9	Virtualization HA will be used for all management components	Manageability
ALL.R12	Virtualization Metro Storage Cluster will be used between the active/active datacenters	Availability
ALL.R13	Storage shall provide snapshot features to provide the snapshot feature to make the read only copy of the backup images in the passive site	Recoverability
ALL.R14	Multi Cluster Infrastructure should use to isolate the workloads	Manageablity

1.2 Design Constraints

Table 2: Design Constraints

Reference	Design Constraints	Design Quality
ALL.C1	Legacy hardware available for building the infrastructure in Mars datacenters	Manageability
ALL.C2	Availability of cloud Administrator with specialized skills is very limited and willingness to work in other planet is challengeable.	Manageability
ALL.C3	The adequate link should be present between all the three datacenters.	Availability
ALL.C4	Power, cooling and space should be as minimum as possible	Manageability
ALL.C5	Synchronous Replication solutions should able to provide RTT of 10ms to build the active/active datacenter.	Availability

1.3 Design Assumptions

Table 3: Design Assumptions

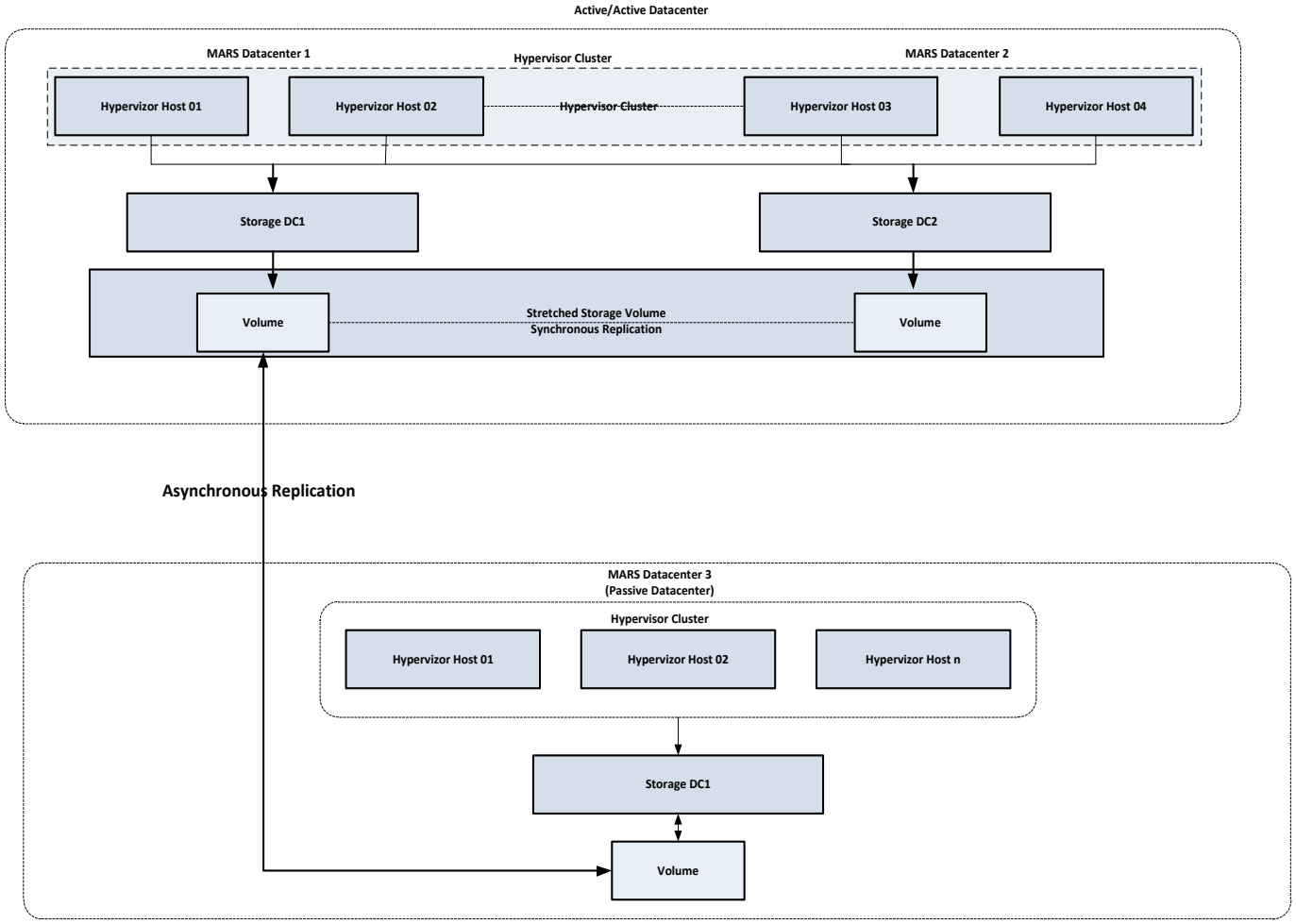
Reference	Design Assumptions	Design Quality
ALL.A1	Centralized Infrastructure Management and orchestration will be used	Manageability
ALL.A2	Dark Fiber will be used between the Datacenter 1 to Datacenter 2.	Performance
ALL.A3	Daily Backup of VMs will be scheduled	Recoverability
ALL.A4	Virtual Machine resource managements methods will be adopted	Performance
ALL.A5	Network Bandwidth between the sites are well adequate to handle the network traffic and storage traffic	Availability

1.4 Risks

ID	Severity	Description
Risk1	Major	Most of the skilled resource have been specifically targeted by Zombies. So there is an inherent shortage of large number of staffs with subject matter expertise.
Risk2	Critical	Since the legacy infrastructure design is used, it will increase the complexity of the solution.
Risk3	Major	People and Process Transformation is key. This should be considered as a separate architecture project itself. But this has to wait, as TOGAF is still framing up the people and process transformation rules for the new Zombie era.

3. Logical Design

This chapter focus on the key design quality attributes to satisfy the conceptual design model covered earlier in the document. While Manageability and Availability have been listed under the design qualities, these attributes are inherent to the proposed Infrastructure design.



3.1- Compute

1) Highly Available Virtualization Infrastructure

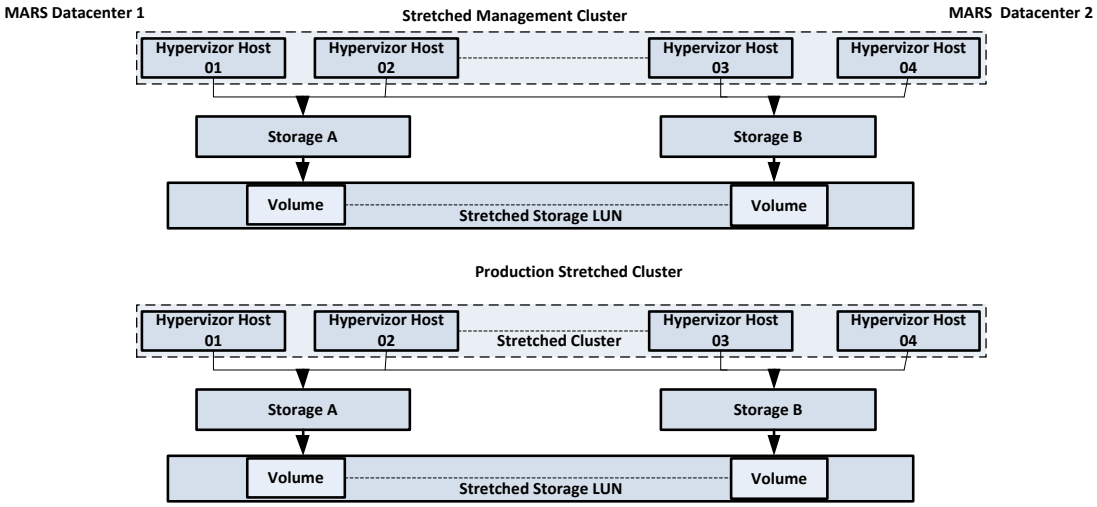
Design Ref.	ALL.R9
Design Choice	High Availability of compute resources

Design Quality	Manageability, Availability
Requirements Reference	ALL.R9
Requirements Conflict	None
Justification	Automatic restart of VM's in the event of host failure. HA will able to recover the VM's event of 1 datacenter failure. 50% of host capacity is reserved for the failure.
Impact	Cost
Risks	None

2) Dynamic Resource Control of Compute Resources.

Design Ref.	ALL.R12
Design Option	1) Automated Load Balancing 2) Partial Load Balancing 3) Manual Load Balancing
Design Choice	Automated Load Balancing
Design Quality	Performance, Manageability
Requirements Reference	ALL.R12
Requirements Conflict	None
Justification	Fully Automated Load Balancing, Compute resource of the cluster load gets automatically balanced. Hosts will be grouped with respect to the location of the datacenter and affinity rule will enabled on the VM's to run in the needed datacenters.
Impact	None
Risks	None

3) Separation of Clusters.



Design Ref.	ALL.R9
Design Option	Number of Pooled, Compute, Storage and Network Resources
Design Choice	1) Management Cluster 2) Production Cluster
Design Quality	Availability, Performance
Requirements Reference	ALL.R9
Requirements Conflict	None
Justification	All the infrastructure management servers will be running in the management clusters and critical legacy applications will be hosted in the production metro cluster, which will be hosted across active active datacenter.
Impact	Separate clusters. Many hosts. Increased cost. Increased administrative overhead
Risks	Increased complexity and cost.

4) Virtual Infrastructure Management.

Design Ref.	ALL.R9
Design Choice	Centralized virtualized infrastructure management with orchestration
Design Quality	Manageability
Requirements Reference	ALL.R14
Requirements Conflict	None
Justification	Reduce the number of integration point with infrastructure component.
Impact	Simplifies the use and configuration
Risks	None

5) Hypervisor Host Sizing

Design Ref.	ALL.C4
Design Option	Host Sizing "scal-up" or "scale-out"
Design Choice	1) Scale Up
Design Quality	Availability, Performance
Requirements Reference	ALL.C4
Requirements Conflict	None

Justification	Since space is a concern in thte datacenter we will go with scale up plan. All hosts will be of identical model and purchased with maximum CPU (latest generation, maximum cores per socket). This will create a standardized environment where host hardware can be reused anywhere within the Corporation. Scale Up is the preferred host configuration for Data Center VMs that have heavy RAM workloads.
Impact	Predictable performance and increased cost
Risks	None

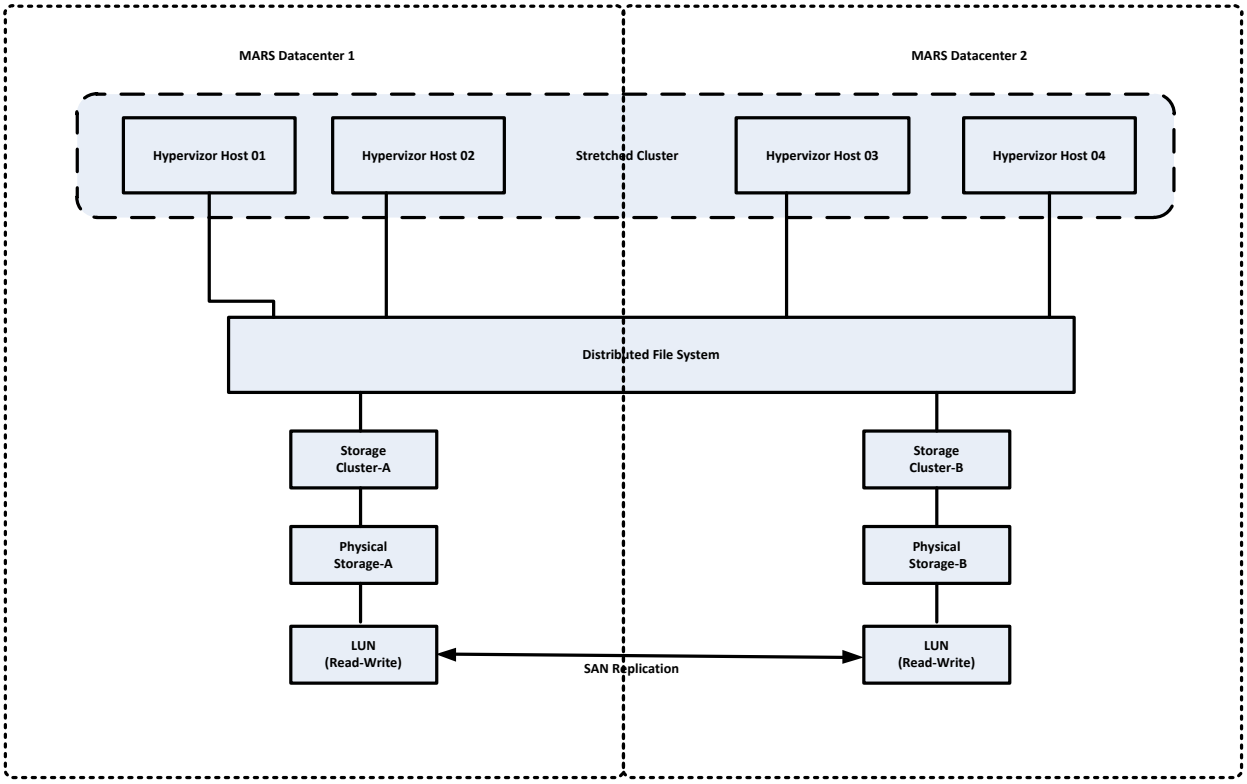
3.2- Storage

1) Storage Array

Design Ref.	ALL.R13
Design Choice	1) Storage Array with FCoE front end ports
Design Quality	Availability, Performance and management
Requirements Reference	ALL.R13
Requirements Conflict	None
Justification	Storage Array with FcoE ports will leverage SAN traffic into the network traffic. Array should support inline de-dup and flash caching tier to provide the performance to the I/O workload.
Impact	Performance and increased cost

Risks	None

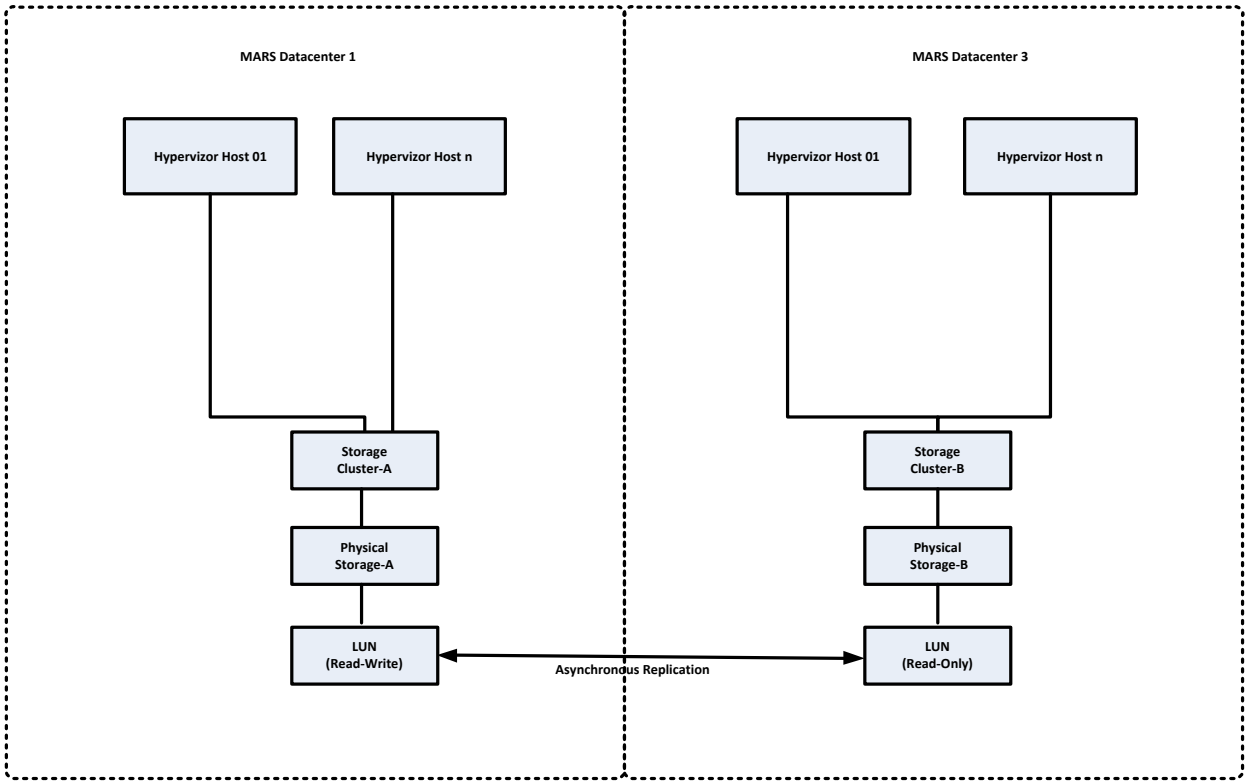
2) Synchronous SAN Replication



Design Ref.	ALL.R13
Design Choice	Storage replication device that support synchronous replication and asynchronous replication.
Design Quality	Availability, Performance and management
Requirements Reference	ALL.R13
Requirements Conflict	None

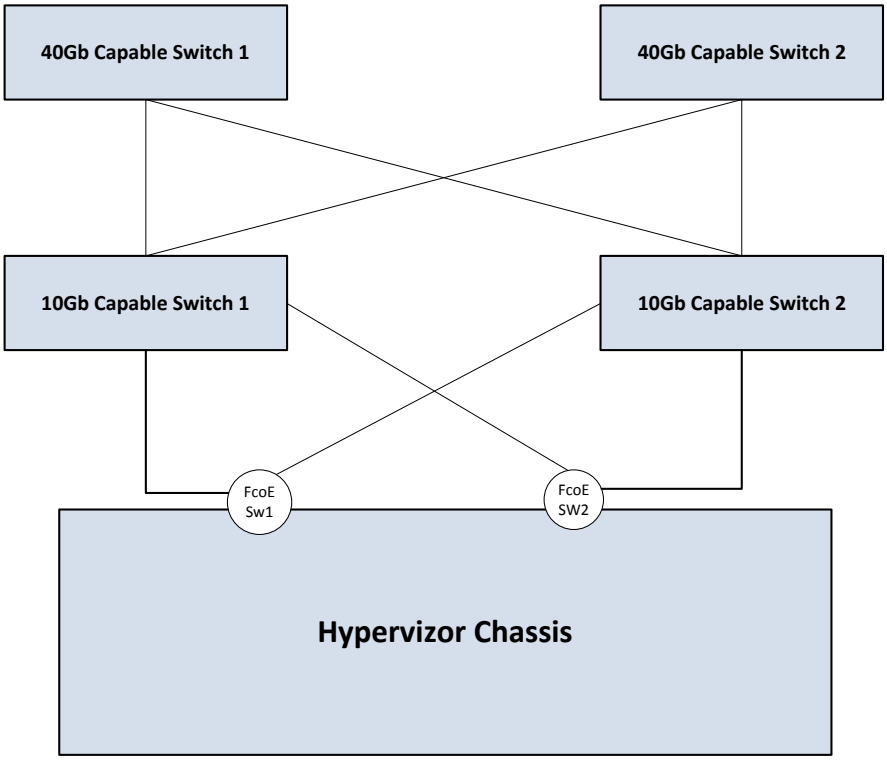
Justification	SAN Synchronous replication supports both R1 and R2 LUN should be R/W on both the datacenter that leads to build Metro Storage Cluster. Synchronous replication will be used between the datacenter 1 to datacenter 2. Dark fiber will be used between the datacenter 1 to Datacenter 2.
Impact	Performance and increased cost
Risks	None

3) Asynchronous SAN Replication



Design Ref.	ALL.R13
Design Option	1) Hypervisor based replication 2) SAN Based Replication
Design Choice	SAN based replication will be used to have the passive copy of the data to maintain the good RPO requirement.
Design Quality	Availability, management
Requirements Reference	ALL.R13
Requirements Conflict	None
Justification	SAN Replication will be used to have the R/O copy of the R2 Device. In the event of failure in the active datacenter, passive copy will brought up with in the defined SLA. Asynchronous replication will be used between the datacenter 1 to datacenter 3.
Impact	Performance and increased cost
Risks	None

3.3- Network

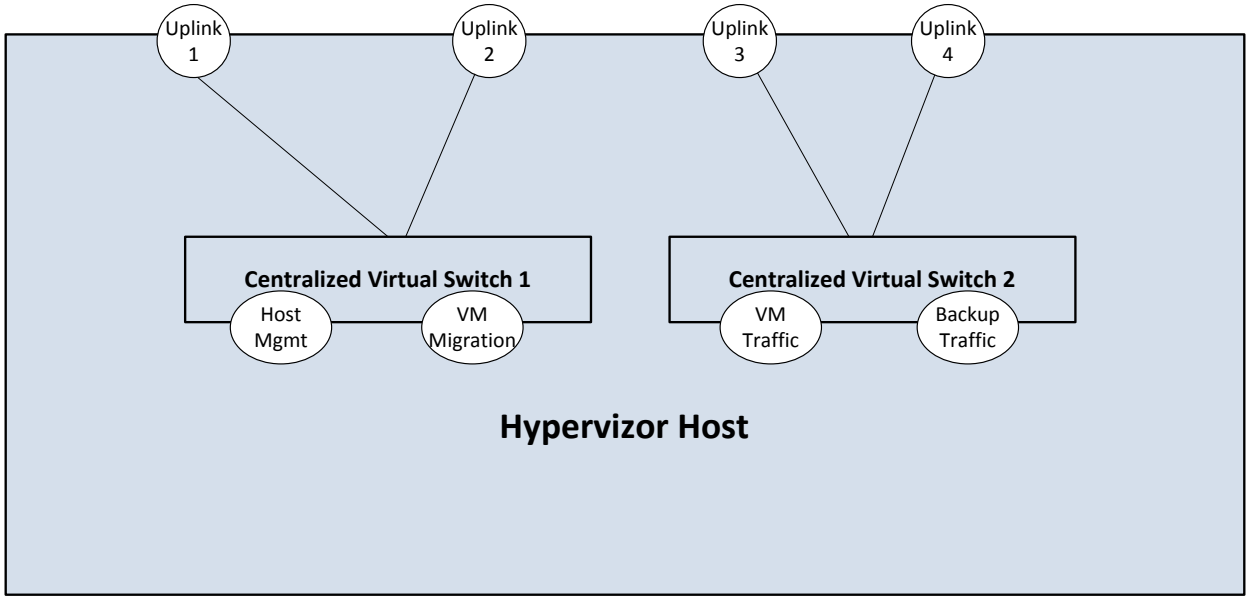


1) LAN Switching

Design Ref.	ALL.R6
Design Choice	Physical LAN Switches and Host NIC will be redundant and 10 Gb capable.
Design Quality	Availability, management
Requirements Reference	ALL.R6
Requirements Conflict	None
Justification	Redundant high speed LAN will be used for VM traffic and Hypervisor service

Impact	High Speed, Highly Reliable, Reduced cabling and Redundant uplinks
Risks	None

2) Virtual Switches



Design Ref.	ALL.R6
Design Choice	Virtual Switches will be used to isolate the functional traffic groups with each 2 uplinks attached to it..
Design Quality	Availability, management
Requirements Reference	ALL.R6
Requirements Conflict	None
Justification	One Virtual Switches will be used for vmotion and host management and another Virtual Switches will be used for VM traffic and backup network.

Impact	CNA Required, Reduced chance of congestion and Redundant uplinks
Risks	None

3) Trunking and VLANs

Design Ref.	ALL.R6
Design Choice	Trunking and VLANs
Design Quality	Availability, manageability
Requirements Reference	ALL.R6
Requirements Conflict	None
Justification	Trunking VLAN's will be used to isolate the functional sub traffic types on the virtual switches.
Impact	Scalable Network and reduced network cabling
Risks	None

3.4- Virtual Machine

1) Virtual Machine Size

Design Ref.	ALL.A4
Design Choice	Standard Virtual Machine sizes will be deployed
Design Quality	Manageability
Requirements Reference	ALL.A4

Requirements Conflict	None
Justification	Protects the Non-NUMA Application from NUMA limits being exceeded and experiencing performance degradation. After Deployment VM Performance can be easily analyzed and sized.
Impact	Scalability and Reduced Administration overhead.
Risks	None

2) vCPU and vRAM Management

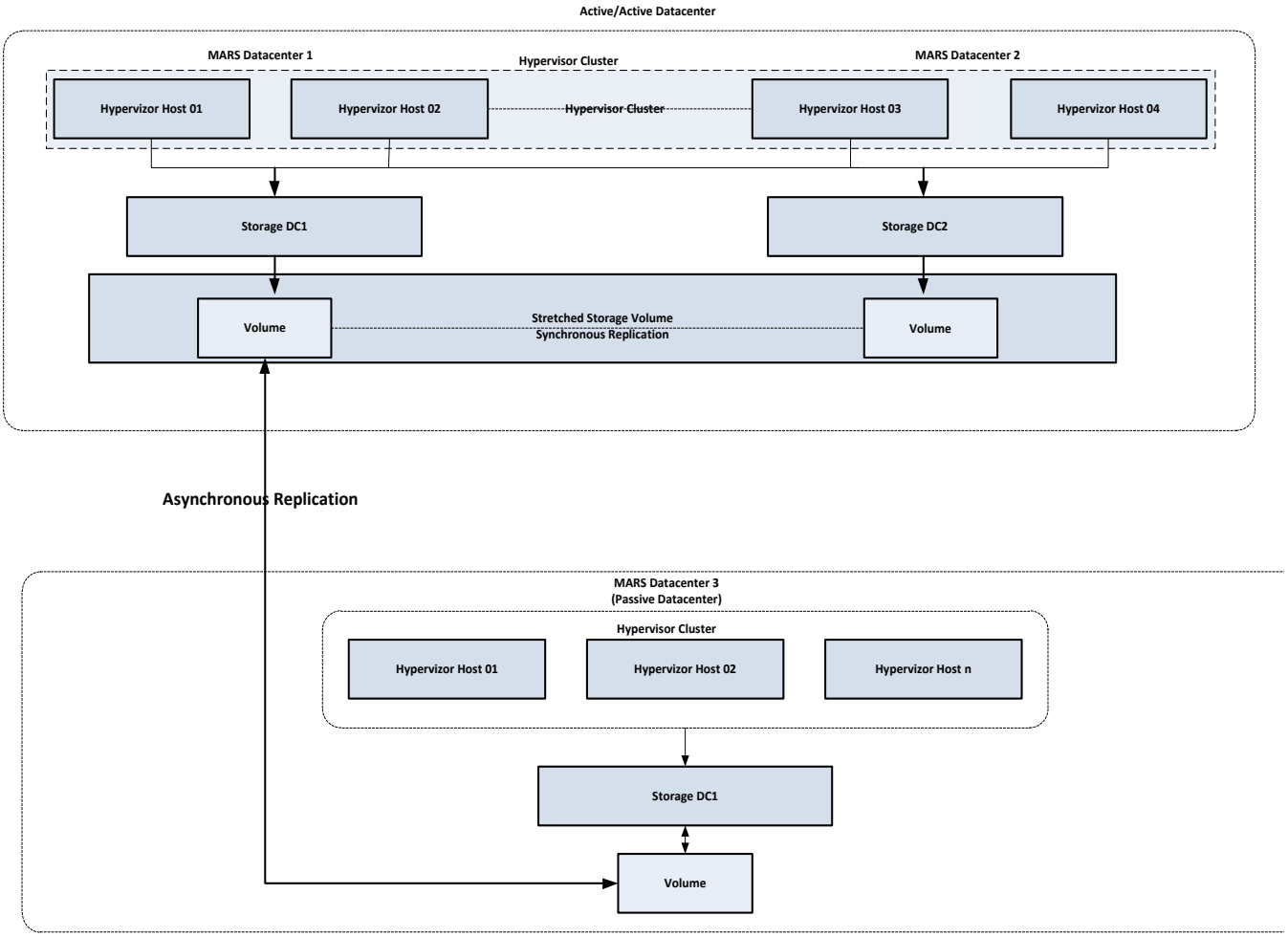
Design Ref.	ALL.A4
Design Choice	Virtual Machine CPU and RAM Management mechanism will be used.
Design Quality	Manageability
Requirements Reference	ALL.A4
Requirements Conflict	None
Justification	Must able to provide Tier-1 VM's priority access to resources.
Impact	Improved Performance Prioritization of resources by policy.
Risks	None

3.5- Backup and Recovery

1) VM Image backup

Design Ref.	ALL.A3
	1) VM Image based backup 2) Agent based backup
Design Choice	VM Image backup
Design Quality	Recoverability
Requirements Reference	ALL.A3
Requirements Conflict	None
Justification	Daily Consistent Copy of All VM's at Datacenter 1 and Datacenter 3.
Impact	Protection against corruption, crashes and deletion of VM.
Risks	None

3.6- Business Continuity/Disaster Recovery (BC/DR)



Design Ref.	ALL.A4
Design Choice	Datacentre 1 and Datacentre 2 will work as Active/Active datacenter and Datacenter 3 will be configured as Passive datacenter
Design Quality	Manageability
Requirements Reference	ALL.A4

Requirements Conflict	None
Justification	Datacenter 1 & 2 will work as active/active datacenter, which will be logically one datacenter to avoid the planned downtime and business continuity. Datacenter 3 will be passive datacenter, which will ready to switch over all the service in the event of disaster.
Impact	Improved Performance Prioritization of resources by policy.
Risks	None

4. Document Control

Version	Reason for Change	Author	Reviewer	Date
1.0	Initial Version	Mohamed Ibrahim		06-July 2015