Challenge #1

By

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Skyfall is an IT Infrastructure and security firm that has been tasked by our billionaire friend to come up with a strategy to put together the IT infrastructure and datacenters which will be needed to deploy the new version of the Humanity Link Software (version 2.0). The new data centers and Infrastructure should accommodate for future expansion on Earth which will be needed as the recolonization project is been executed.

As part of the earth recolonization project, robots have been task to carry out the process of eliminating and preventing any new Zombie insurgency in collaboration with Skyfall security forces. Due to this new plan it has been requested by the project sponsor that the design should be highly resilient at all levels and it should be based in a 3 sites setup.

Project Requirements:

PR1	The Design must include 3 sites
PR2	Robots need to operate in 3 different shifts to provide 24 hours coverage. (Shift #1 will be from 8AM to 4PM, shift #2 will be from 4PM to 12AM and, shift #3 from 12AM to 8AM). This will be performed at all 3 sites.
PR3	Robots maintenance must be done offline only after primary assigned shift is finished.
PR4	The new version of the Humanity Link Software should be highly available and accessible from all 3 sites.
PR5	The Humanity Link software will incorporate new features for scheduling, operations and maintenance.
PR6	The design must provide resiliency at all level of the infrastructure.
PR7	Communication between Robots and their home base must be secured.

Project Risks:

R1	Possibility of another Zombie Insurgency is possible.
R2	Need for strong and secured WIFI Connection between sites must be established

R3	Skyfall's employees must be trained on the all the new features included in the Humanity Link Software (version 2.0)
R4	Supplying all 3 sites with enough inventory for parts and provisions for employees at each site.
R5	Unknown Software bugs which have not been discovered.

Project Constraints:

PC1	Datacenter locations on Earth are minimal to none after the Zombie Apocalypse
PC2	Satellite Signal strength between sites must be accounted
PC3	Need to train new employees to maintain and operate 3 datacenter sites.
PC4	Satellite signal repeater towers need to be built.

Project Assumptions:

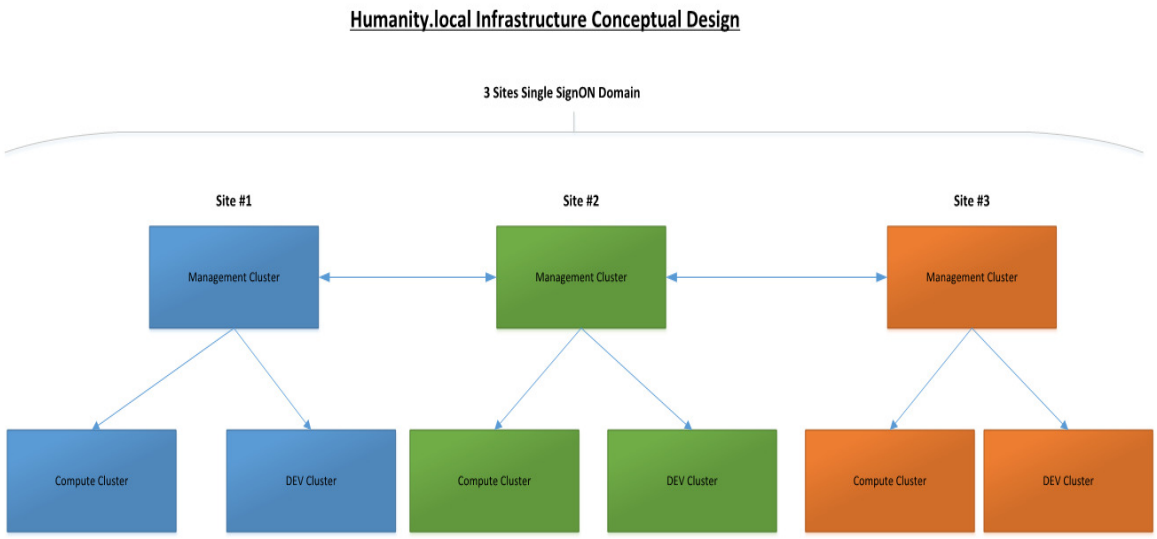
PA1	The Humanity Link software will be a 3 Tier application composed of Web, Application and database servers.
PA2	Skyfall will manufacture the robots and parts. Inventory will be unlimited.
PA3	Signal repeater towers will be built in strategic locations by Skyfall as part of this deployment.
PA4	The Skyfall connections software that manage the virtual machines assigned to each Robot will be able to register with multiple vCenter servers
PA5	All 3 sites should be able to be manage from a single pane of glass independent of which location a manager logins.

Taking in consideration the Project requirements provided to Skyfall, this entity is recommending a design composed of 3 main datacenters. Datacenter #1 will be located on

Area 51 in the state of Nevada (USA), datacenter #2 will be located in ZONE US51 at the Moon, and datacenter #3 will located in the old Russian Arctic Trefoil military base. US Satellites orbing the earth and strategic placed towers placed on earth will be utilized as a repeaters to strengthen the high speed satellite connection between the 3 datacenters.

At each datacenter the hardware that will be utilized will be composed of servers in 1U and blade format provided by the only server manufacturer available CiscoRus. Skyfall will be creating 3 clusters per datacenter to segregate the management, compute and development servers.

Conceptual Design



Design Choices:

Choice	Design Decision	Design Implication
Datacenter #1 will be located on Area 51 on earth	Due to the fact that this location used to a US military base, it already contains the accommodations necessary to prevent any attack by any new Zombie or third party insurgency	Local transportation of employees will be a challenge due to its location at the desert. Employees will need to be transported in and out via planes and helicopters
Datacenter #2 located on ZONE U51 at moon	A US NASA Base located on the moon will be used as	Location of the base on the moon needs to be accounted for data transmission speed.

	colocation for the secondary site for the project.	Physical Infrastructure on this base must be equipped to host Robots as humans. Transportation of inventory and employees to this location might result too expensive
Datacenter #3 located on Russian Arctic Trefoil military base	This location was chosen for its strategic placement on earth and its capabilities to supply the demand for robots in Europe and Africa	Local transportation of employees will be a challenge due to its location at the Artic. Employees will need to be transported in and out via planes, helicopters and boats
Use of a USA Satellites and strategic Towers as a satellite signal repeaters	Due to the distance between the datacenters on Earth and the Moon, a high speed connection is needed to connect all datacenters. To be able to guaranty the strength of the signal the satellites and towers will be used to forward the signal in different ways.	Cost implication to use the US satellite and Towers.
Management Clusters	1-The management cluster will be used to host all the management virtual machine servers that will be used to manage the virtual infrastructure in each datacenter. The Humanity Link software virtual machines will be host in this cluster. 2- There will be 1 separate vCenter servers for Management and compute level for each site	Separate Hardware needed
Compute Cluster	1- The compute vCenter server will manage the virtual machines at the compute and development clusters.	Separate hardware needed

	2- A compute cluster will be used to host the virtual machines corresponding to the robots. A virtual machine will be deployed per robot	
Development Cluster	A Development cluster will be used to test new images before they are provisioned to the robots in production	Separate hardware needed
vSphere Stark Trek version	vCenter Servers for management and compute level at each site will be setup in High Availability to prevent outages in case of server failure	The foot print of virtual machines per management cluster is increased.
vSphere Stark Trek Platform Service Controllers	The Platform service controllers for each site will be configured in High Availability to prevent any outages.	A load balancer virtual server must be created to sit in front of both platform service controllers.
A Single Sign ON Domain will be created which is composed of 3 sites	Each datacenter site will be part of the same Single Sign ON domain	Single Sign ON authentication components for each site need to be added to the same Sign ON domain
Domain name Humanity.local will be used for authentication	For Authentication purposes a Single root domain humanity.local will be created.	Every virtual machine assigned to each robot must be joined to this domain
Two Factor Authentication will be enabled	In order to login into the virtual infrastructure or access Humanity Link application, users will need to provide 2 sets of credentials: 1- Username/password for the Humanity.local domain. 2- A soft token provisioned by Skyfall Security. The soft token will be implanted in the user's forearm and will light	Soft Tokens and domain credentials must be provided to every administrator.

	up every time the user's forward is turned upward.	
Software Define Storage will used at the management cluster.	Software Define Storage provisioned by VSAN Star Trek version will be used to provision the storage layer	Enough SSD disks class XYZ must be available.
Even number of disk groups will be created per server	Each management cluster node will be equipped with an even or redundant number of disk groups to prevent data lose in case of disk group failure	There must be enough SSD disk available.
Conventional storage will be used at the compute and development cluster	Conventional storage composed of high speed spindles will be used to store the virtual machines assigned to each robot	A separate SAN must be administer per site.
Software Defined Networking will be thru the entire infrastructure	Software Define Networking provided by NSX Star Trek version will used to create an overlay network for the management, compute and development cluster	Organization zones will need to be created to allow flow of communication
Virtual networks will be stretch between data center sites	Virtual networks will be stretch between datacenter site using NSX to facilitate disaster recovery	NSX Star Trek must be installed and configured on all 3 sites.
Site Recovery will be performed by SRM Star Trek edition	Management workloads which are not configure in high availability will be protected by SRM Star Trek Edition	SRM Star Trek edition must be installed and configured on all 3 sites
Multiple SRM Protection will be created	To maintain availability of the Humanity Link application and other infrastructure components multiple protection groups will be created and setup to enable replication in between sites.	Protection groups need to be configured to prevent any data and operation lost in case of a site going offline.
Horizon View Star Trek Edition	Horizon View Connection servers will be used per site to manage the virtual	Robots will be need to be manufactured and configured to have a

	machines assigned to each Robot	presence in the humanity.local domain
Robots credentials in the Humanity.local	1- During each robot's configuration it will be assigned a set of credentials which will be assigned to a specific machine at each Horizon View connection server. 2- Robots will be loaded with a preconfigured client.	Each robot must be assigned a dedicated virtual machine.
Horizon View Administrators will create master copy machines.	Instant clones will be created from a master virtual machine's snapshot	Instant clones assigned to a robot can be deleted once the robot come back to base.
Humanity Link Software	The Humanity Link Software will be deployed in 3 tier application format in which the Web, Application and database servers will be residing on their own logical switch and segmented by NSX Star Trek version	Logical switches for each virtual machines will need to be created and the traffic from one to another will be allowed by predefined firewall rules.
Remote Access Server farm	1- The Humanity Link software client will be installed in a Remote Access server farm which will be connected to the Horizon View servers to allow access to the software 2- The Horizon client will also use two factor authentication	The horizon client must be loaded in each administrator's computer or tablet to allow connection to the Humanity Link software

Logical Design

At each datacenter, the Management cluster will be composed of 4 C520 1U nodes from CiscoRus. This cluster will be setup using the vSphere Stark Trek version to manage the virtual

infrastructure and ESXi Stark Trek as the Hypervisor of choice. Each node will have the following technical specifications:

4 CPU Sockets (50 cores each)

5 TBs of memory

Dual 250 GBs XSD cards

2 Dual (200 GBs) NIC cards

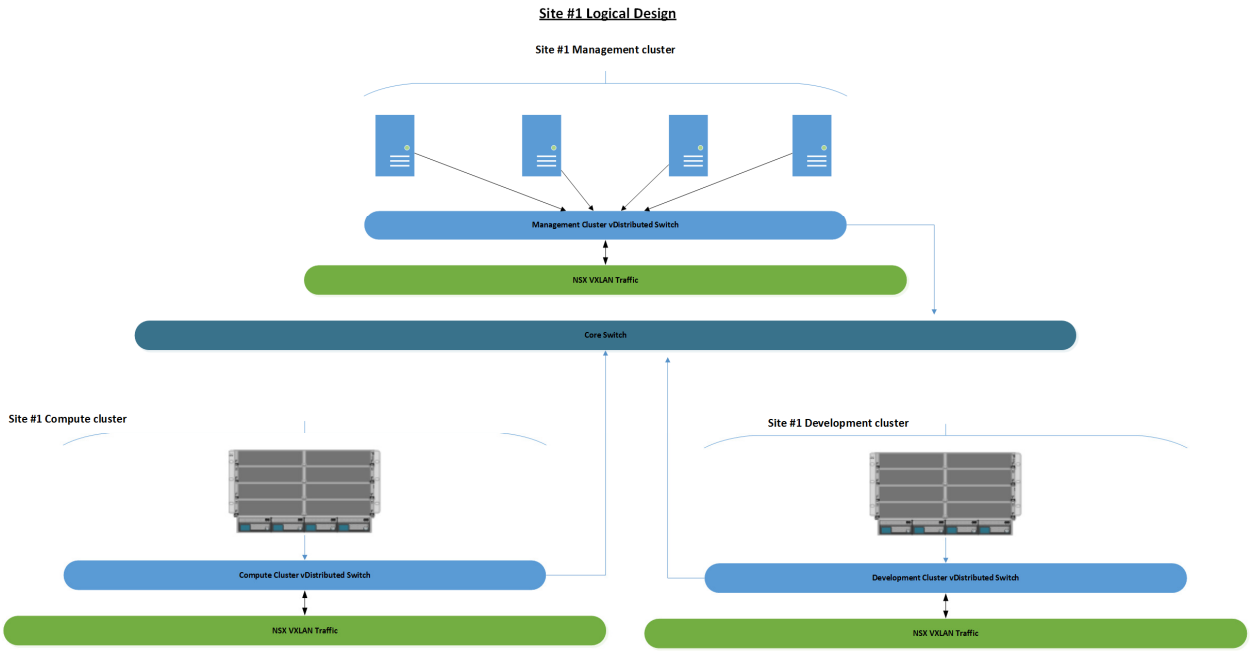
The compute and Development clusters will be composed of 8 Physical Blade servers B800 from CiscoRus. Each node will have the following hardware specifications:

4 CPU Sockets (50 cores each)

10 TBs of memory

Dual 250 GBs XSD cards

Vic2025 cards at (200Gbs)



Physical Design

Site #1 Physical design