*DNM2: Data Center Virtualization*

# Company Overview and Requirements

Augusta Crissy Detective Games’ new role-playing virtual reality escape room game is becoming increasingly popular and requires that the company explore options to update its infrastructure to accommodate the company’s growing needs. The company is considering investing in updates or alternatives to its current data center and its supporting systems. Although the data center currently has the capacity to support the game, the growth trends require that the data center systems be virtualized and its capacity extended.

The physical expansion options for the data center are constrained by the size, power rating, and the cooling ability of the data center, as well as by the lack of leasable space. The data center virtualization process should support an increasing number of game subscribers. One option the company is researching is implementing a hybrid-cloud local data center solution focused on gaining additional server space and capacity in addition to the current physical data center infrastructure.

It is estimated that the virtualization project will take at least six months to complete the design, testing and validation, and implementation phases. The company will need to establish and document adequate processes to ensure continuity and appropriate implementation of a solution that will support the game and its infrastructure.

The project manager has requested that a design plan and a proof of concept be created for the data center virtualization project, as the company needs assurances that a solution can be created and operated in line with the expected benefits and the anticipated growth and resource needs, as well as within the known physical constraints. The proof of concept will be shown in the form of a video presentation to the project manager once it is completed and tested.

This document captures the notes on the current infrastructure and the business and technical requirements the IT architect has collected in conversations with various company stakeholders that will guide the prototyping.

## Current Game Servers Configuration

* 100 Dell 940xa Rack Servers, 4X Xenon 8-Core processors (32 processors total), 8x32 GB performance-optimized RAM (256 GB local RAM), and 1 TB local data storage running Windows Server 2016 in single OS mode, not clustered or hypervisor type 2
* 10 VMWare ESXi Type 1 hypervisor software package
* 10 Cisco SPS2024 24-port switches
* 1 Cisco Nexus 7770 Supervisor 3E as core router/switch
* 1 Microsoft AD/RAS Server 2016 for internal employees
* 1 Microsoft AD Server 2016 for external game players
* 1 Dell PowerVault ME4 SAN storage supporting 100 TB of data, backed up fully every month to tape, and incremental nightly

**Current ADMIN and DATA Networks**

There are currently two networks:

* one ADMIN network that allows for admin access to all switches, a storage area network (SAN), and computer systems for patches, updates, maintenance, backups, game updates, and other general support
* one DATA network for customer game playing use

Regular employees do not have access to the ADMIN network; they can only access the game play network via the DATA network.

## Current CORP Network

* 150 Dell XPS desktops running Windows 10 with Visual Studio Enterprise Edition installed (check-in, check-out software development)—Ties to SAN SERVER in the datacenter for document storage
* 4 Apple iMac systems running graphics development software
* 10 Dell 940xa Rack Servers, 4X Xenon 4-Core processors (16 processors total), 4x32 GB performance optimized RAM (128GB local RAM), and 1 TB local data storage running Windows 2016 Server in single OS mode, not clustered or hypervisor Type 2 running the following:
  + email
  + IIS
  + DNS server
  + AD server
  + RAS server
  + Kronos server (HR, time management)
  + information security management system (internal ISMS)
  + patch management system
  + MS SQL Server with Analytics
  + SharePoint Server X2 (SP1, SP2 ties to SAN server in the datacenter for document storage
* 10 Cisco SPS2024 24-port switches
* 1 Cisco Nexus 7770 Supervisor 3E as core router/switch
* Network broken into the following VLANs:
  + VLAN-ADMIN network that ties 12 workstations to the jump box allowing access to ADMIN network in the datacenter
  + VLAN-EMP that allows access to all systems but HR
  + VLAN-DEV, a development VLAN for 20 internal programmers and 50 external (out-of-country) game programmers access to SharePoint 1 (SP1) and Visual Studio Enterprise only
  + VLAN-HR that allows access to HR systems and employee systems
  + VLAN-SysADMIN that allows access to patch management, jump box, ISMS, RAS, email/DNS only

## Required Configurations for the Proof of Concept

The IT director is a hands-on person and is therefore uneasy about the decision to virtualize many of the resources. The IT director is requesting that you develop a proof-of-concept solution to demonstrate the benefits and feasibility of virtualization for the company’s environment. The following described configuration should be provided as the proof of concept.

The IT director has provided the following ISOs:

* Windows 10 Enterprise
* Windows Server 2019 Standard
* Windows Server 2019 Datacenter
* vSphere 6.7 ESXi free version
* pfSense

Within a single ESXi environment, you should configure *all* the following components (Each virtual machine configuration and virtual disk should be stored within datastore2):

* Server named ESX-1 (provided ESXi Server):
  + Create a port group named “DEV” using VLAN ID 2
  + Create a port group named “SysADMIN” using VLAN ID 3
  + Create a port group named “Public” using VLAN ID 0
* VM Server named DC01 with Windows Server 2019 Standard provisioned:
  + 2 virtual network interfaces installed with the following configurations:
    - vNIC1 for accessing port group DEV
    - vNIC2 for accessing port group SysADMIN
  + Install and configure domain controller with augustacrissy.lab domain name
  + Configure RDP to allow connection from JMP01 (See below)
  + Install and configure DNS; ensure all VMs have an IPv4 host record
  + DHCP scope configured to support up to 6 IP addresses
  + Windows Firewall configuration:
    - permit HTTP, HTTPS, DNS, RDP, and DHCP inbound requests
    - permit all outbound traffic

* VM Server named Router with pfSense provisioned:
  + vNIC1 installed and configured to access port group DEV
  + vNIC2 installed and configured to access port group Public
  + vNIC3 installed and configured to access port group SysADMIN
* 2 VM Servers named IIS01 and IIS02 with Windows Server 2019 Datacenter provisioned:
  + 4 virtual network interfaces installed with the following configurations:
    - vNIC1 and vNIC2 should be installed and configured to be on a NIC team to access port group Public
    - vNIC3 installed and configured to access port group SysADMIN
    - vNIC4 installed and configured to access port group DEV
  + Configure servers to be domain members of augustacrissy.lab
  + Enable Remote Desktop Services
  + Install and configure the Network Load Balancing feature. Both installations should be nodes on a NLB cluster supporting equal distribution of web traffic from the Public port group.
  + IIS installed and configured for anonymous access; default IIS home page acceptable for demonstration purposes
  + Windows Firewall configuration:
    - permit HTTP, HTTPS, and RDP inbound requests
    - permit all outbound traffic
* VM desktop named JMP01 with Windows 10 Enterprise provisioned:
  + 2 virtual network interfaces installed with the following configurations:
    - vNIC1 installed and configured to access port group DEV
    - vNIC2 installed and configured to access port group SysADMIN
  + Configure PC to be domain member of augustacrissy.lab
  + vNIC1 configured to receive its IPv4 address from DC01’s DHCP server service
  + DNS requests should be configured to be sent to DC01

**Project Manager Requirements for the Proof-of-Concept Presentation:**

|  |  |  |
| --- | --- | --- |
| **Tool** | **Project Manager Request** | **Notes** |
| PowerShell or GUI on Windows systems | Provide evidence of server implementations | Use Get-NlbClusterNode for evidence of each Windows Server in the cluster |
| PowerShell or GUI on Windows systems | Capture output for clusters or capture output of the network load balancer | Use Get-NlbCluster to get evidence of the network load balancer (NLB) cluster or show evidence of converged clusters in NLB |
| ESX-1 Network Object | Show that network configurations meet the network requirements | Show virtual switch, port groups, and VLAN  configurations |
| JMP01 | Demonstrate JMP01 can RDP into all servers | Capture that an individual user from the JMP01 system can successfully make an RDP session to all the servers |
| DC01 and DC02 | Demonstrate denial of inbound traffic from external networks except web traffic | Capture a successful IIS homepage connection and denial of other service of your choice |
| Host, virtual guests, network configurations | Describe which security solutions the proof-of-concept has implemented | Document the security measures taken in this build, such as network segregation, firewall rules, etc. |
| ESXi Monitoring Object | Outline memory, CPU, and network management monitoring | Provide a report that captures 3–5 different counter properties for *each* of the following aspects: memory, CPU, and network management |