

S9219 – Designing and Implementing a VDI project powered with GPU hardware
Veterans United Home Loans
Steve Massman – System Engineer



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Steve Massman

System Engineer on End User Computing team

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Twitter: @SteveMassman

About me:

- 20 years in IT with focus on system administration of Windows and VMware environments
- Mid-Missouri VMUG Leader since 2012



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About Veterans United

- Family-owned since founding in 2002
- Headquartered in Columbia, Mo. – Nearly 2,500 employees
- Full-service 50-state + DC lender – VA, FHA, USDA, Conventional – to meet needs of all Veterans
- No. 1 VA lender in the country
- Driven by our values
 - ***Be passionate and have fun***
 - ***Deliver results with integrity***
 - ***Enhance lives every day***



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Session goals

- Review our POC
- Why IT likes VDI
- VU's EUC team
- Why vGPU
- VU's current version of VDI
- Review survey responses
- Command line upgrades
- vGPU unique challenges



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• All the great leaders and organisations communicate the same way...

• It's the WORLD'S simplest idea 

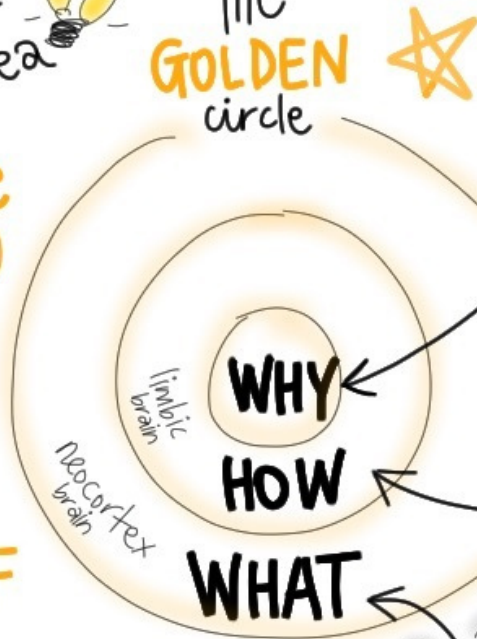
• YOUR PURPOSE (not PROFIT)

• YOUR cause

• YOUR BELIEF

Why should anyone care?

The GOLDEN circle



START

WITH WHY

Simon Sinek

www.startwithwhy.com

TED TALK

People don't buy WHAT you do, they buy WHY you do it.

DO BUSINESS with people who believe what you believe

Few People or ORGANISATIONS know WHY they do what they do.

INSPIRED leaders and organisations communicate from the

INSIDE OUT

We KNOW How we do it

We KNOW WHAT we do...

MARTIN LUTHER KING

I Believe

IT LINKS DIRECTLY to how our BRAIN works

• Law of DIFFUSION of INNOVATION



by www.lynnecazaly.com



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Back drop

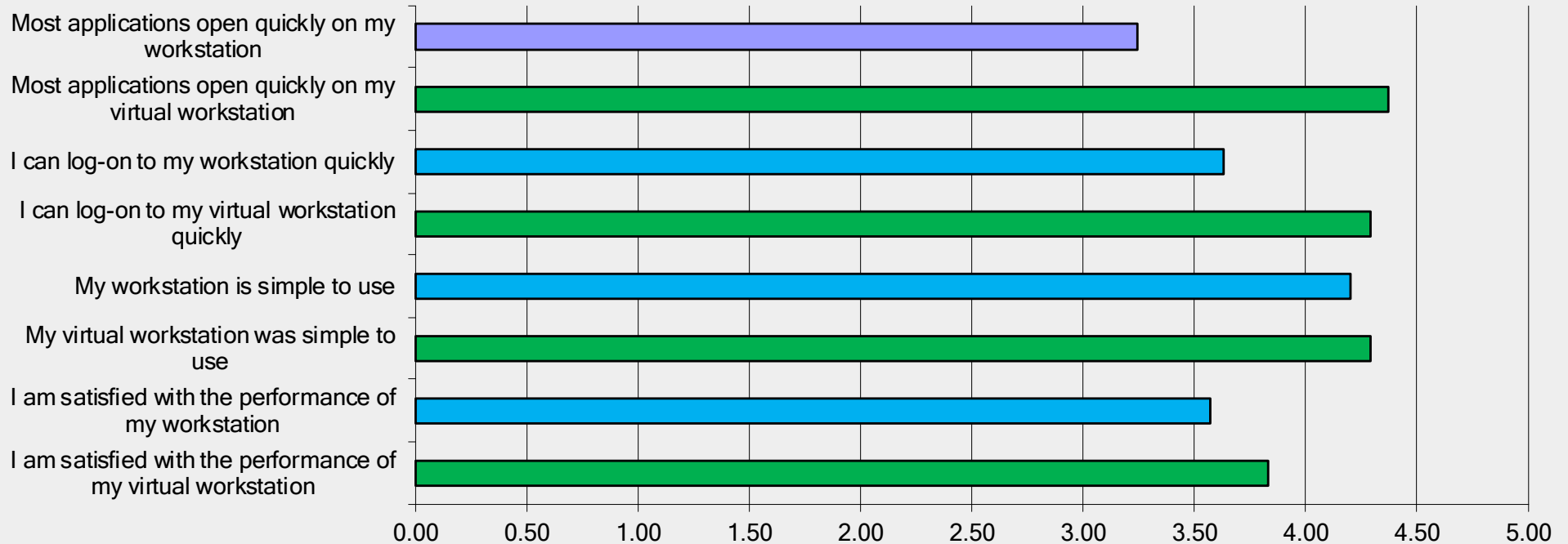
- Financial services company spanned from 1800 - 2500 employees
- **2014:** Through a successful proof of concept (POC), our company purchased a VDI Stack for 300 users but failed to communicate the “why” outside of IT
- **2015:** Spent 2015 attempting to “push” VDI to the company
- **Jan2015–Apr2016:** all who used it were no longer using it
- **Apr2016:** VDI Project given to EUC Team
- **Dec2016:** NPS moved from -55 to +3
- **Oct2017:** NPS moved to 35
- **Dec2017:** ordered Cisco UCS C240M5 servers with NVIDIA M10 cards for 600 users
- **May2018:** NPS moved to 37



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2014 POC Results

Workstation Performance Comparison

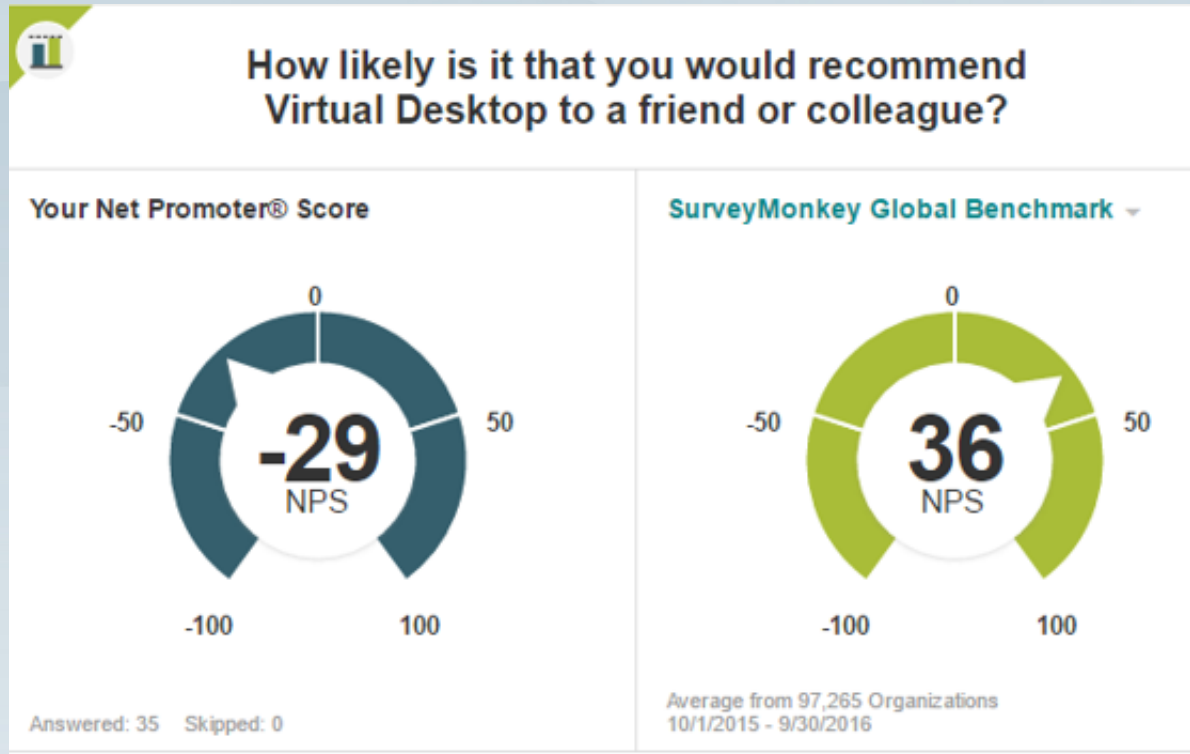


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How are you measuring performance & project success?



$$\text{NPS} = \% \text{ ☺ } - \% \text{ ☹ }$$



Comment from Detractors

- ▶ “VDI did not hold any of my preferences or credentials, every night they all re-set. There was latency when moving from screen to screen or application to application.”

Comment from Detractors

- ▶ “I think we would have a better perception if we were Solely on VDI. But because we had to go throughout original system to get to the VDI, efficiency may be I misperception”

Comments from a Promoter

- ▶ “Everything ran faster, less hangups, no freezing, CRM worked much better overall. Don't take it away!!!!”
- ▶ “I found the VDI platform to be much quicker than my laptop. There are a few tweaks here and there that would be nice, but overall I liked working on VDI. I am not looking forward to going back to my laptop on Monday.”
- ▶ “Definitely an increase in speed and overall a good upgrade!!”
- ▶ “The entire system crashed in the middle of an application, but other than that the system worked wonderfully during my trial run!”

VDI POC Stack Specs:

- AMP layer for management
- Compute: Four Cisco UCS B200 M3 blades for VDI
- Storage: XtremIO (all flash)



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How did we get vBlocks and not have business buy in?

- Pair of vBlocks were purchased to handle production servers for our business and some of the compute was set aside for 300 users on VDI with the following specs
 - 2 CPU 4GB ram, Windows 7 Office 2010



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IT Likes VDI because

- More secure
 - No documents residing on user's physical devices
 - User data and persona settings reside on network shares (data backed up)
 - No printer or client drive redirection
 - No viruses from pen drives or home computers
 - No local admins
 - External access
 - Requires MFA thru our Okta service
 - No clipboard in or out with external access

IT Likes VDI because

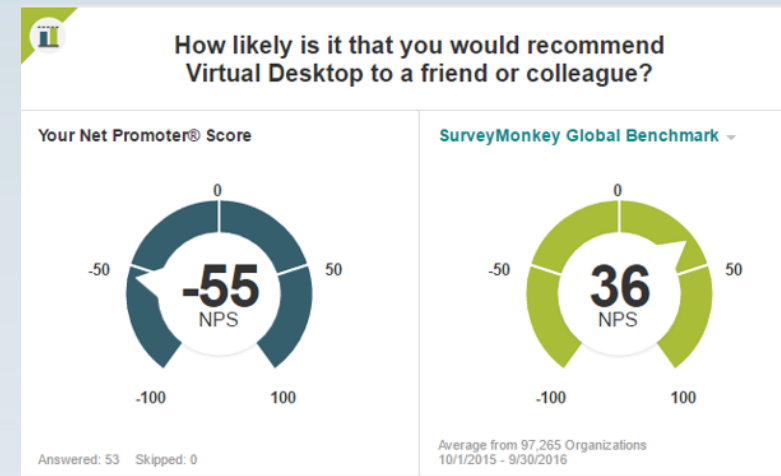
- More reliable than physical computers
- Simpler administration
- Faster internet speeds within virtual desktops than at our offices
 - We use several “cloud” based applications that rely heavily on public internet.
- Typically less bandwidth used for VDI than physical devices
 - All VDI sessions are capped at 10MB/s
- Faster provisioning of computers
 - Non-persistent VDI pools. Users reboot and get a new virtual desktop



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Successful POC = Smooth sailing right?

1. From 53 Respondents -55 NPS because:
 1. No user persona persistence (UEM)
 2. No dedicated support staff
 3. Lacked VDI expertise
 4. Lacked sponsor support



Jan 2015 – Apr 2016



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Our PRB/EUC team is asked to help in Q2 2016

- Company and IT snapshot was
 - ~2000 Employees
 - IT Engineering staff:
 - Architect/Design/Implement team
 - Engineering Operations
 - Support with 3 teams (service desk, 2-tier, problem mgmt. team)
 - IT security
 - Project management and application team



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Book study across the whole team



- “You will need to uncover the requirements and behaviors of each of the use cases to fully understand what services the use cases will require, and how you would architect a solution for them.”
- “Do not ignore use cases that can offer the largest impact by modernizing their EUC experience, even if the user base is smaller.”
- “Today non-persistent desktops should be the preferred method and only ruled out when the requirements cannot be met.”
- “Applications can make or break your project.”

Suhr, Brian. (2016) Architecting EUC Solutions. CreateSpace Independent Publishing Platform



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Team Future State



End User Computing team vision

“The trusted team that delivers The desktop experience that users don’t even have to think about.”



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EUC Team with Agility

Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it.
Through this work we have come to value:

Through this work we have come to value:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.



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EUC Team of Principles

- Highest Priority, early and continuous delivery to the desktop experience
- Welcome change, customer advantage
- Business and IT must work together daily
- Art of maximizing the amount of work not done
- Face to Face as much as possible
- Continuous Improvement = 2 Week Retrospective

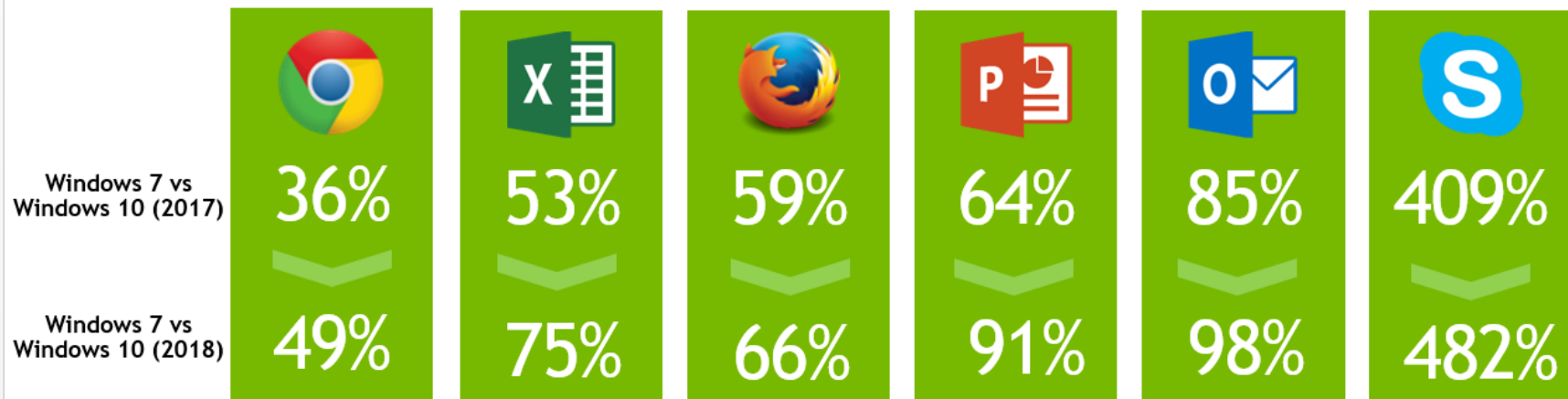


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Why NVIDIA vGPU

MODERN APPS IN THE DIGITAL WORKPLACE

Demands More Graphics



Applications that require graphics has doubled since 2012

Over half of enterprise users access at least one graphics accelerated app

Lakeside
SysTrack

*Percent of time consuming GPU (DirectX or OpenGL). Windows 10 builds in 2017 is based on data from builds 1709, 1703 & 1607. Windows 10 builds in 2018 is based on data from builds 1803 and 1709

2

NVIDIA



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Why NVIDIA vGPU

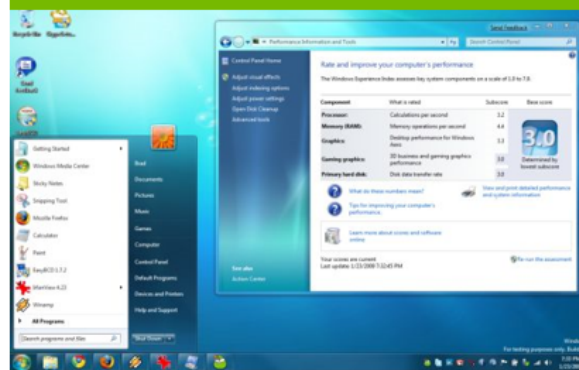
WINDOWS 10

Highest Graphics Requirement of any Operating System to Date

WINDOWS XP



WINDOWS 7



WINDOWS 10



Windows 10 Requires a 50% Increase in graphics requirements, compared to Windows 7

VU's current version of VDI

- Currently licensed for 300 named users of VMware Horizon View Enterprise
- Hardware capacity for ~350 with N+1 failover in each datacenter
- Currently have ~220 users with plans to reach 300-400 by end of this year
 - Call Center staff (~45)
 - Operations staff (~45)
 - Majority work remote
 - IT users (~60)



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VU's current version of VDI

- Hardware for production datacenter:
 - Seven Cisco UCS C240-M5 servers
 - Dual Socket Gold 6132 @ 2.60ghz 14 core
 - 512GB memory
 - Two NVIDIA M10 Grid cards
 - Fiber Channel connectivity to storage
 - Pure Storage M20 all flash array
 - 11TB usable, with VDI using only 500GB with snapshots at
 - 7:1 data reduction (dedup)
 - EMC ISILON
 - For user redirected data (desktop, documents, favorites, ...)
 - Windows Servers with DFS-R on Pure Storage
 - For OST and UEM settings



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VU's current version of VDI

- Hardware for DR datacenter:
 - Eight Cisco UCS B200-M3 blade servers
 - Dual Socket E5-2680 v2 @ 2.80ghz 10 core
 - 384GB memory
 - Fiber Channel connectivity to storage
 - Pure Storage M20 all flash array
 - EMC ISILON
 - For user redirected data (desktop, documents, favorites, ...)
 - Windows Servers with DFS-R on Pure Storage
 - For OST and UEM settings



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VU's current version of VDI

- Software:
 - VMware vCenter 6.7
 - vSphere
 - 6.7 (Production)
 - 6.5 (DR)
 - VMware Horizon View 7.6
 - NVIDIA GRID 7.1
 - VMware UEM 9.5
 - VMware App Volumes 2.14.12
 - VMware UAG 3.2



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VU's current version of VDI

- Windows 10 base image
 - 2 vCPU and 8 GB memory
 - NVIDIA M10-1B profile
 - Windows 10 Enterprise (1709)
 - Office 2016
 - Cisco Jabber
 - Internal applications
 - VDI related agents
 - Performance tweaks
 - VMware OS Optimization Fling
- Dell Wyse ThinOS thin clients



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Monthly base image update cycle

- Update base image
 - Install monthly Microsoft security updates and other application updates
 - Any performance or customization tweaks
- Deploy base image to test pools
 - Ask for IT users to test changes (2 days)
 - Ask test users (various roles across organization) to test changes (5 days)
 - Users are asked to complete a testing steps checklist to “certify” the base image update
- Deploy base image to production pools

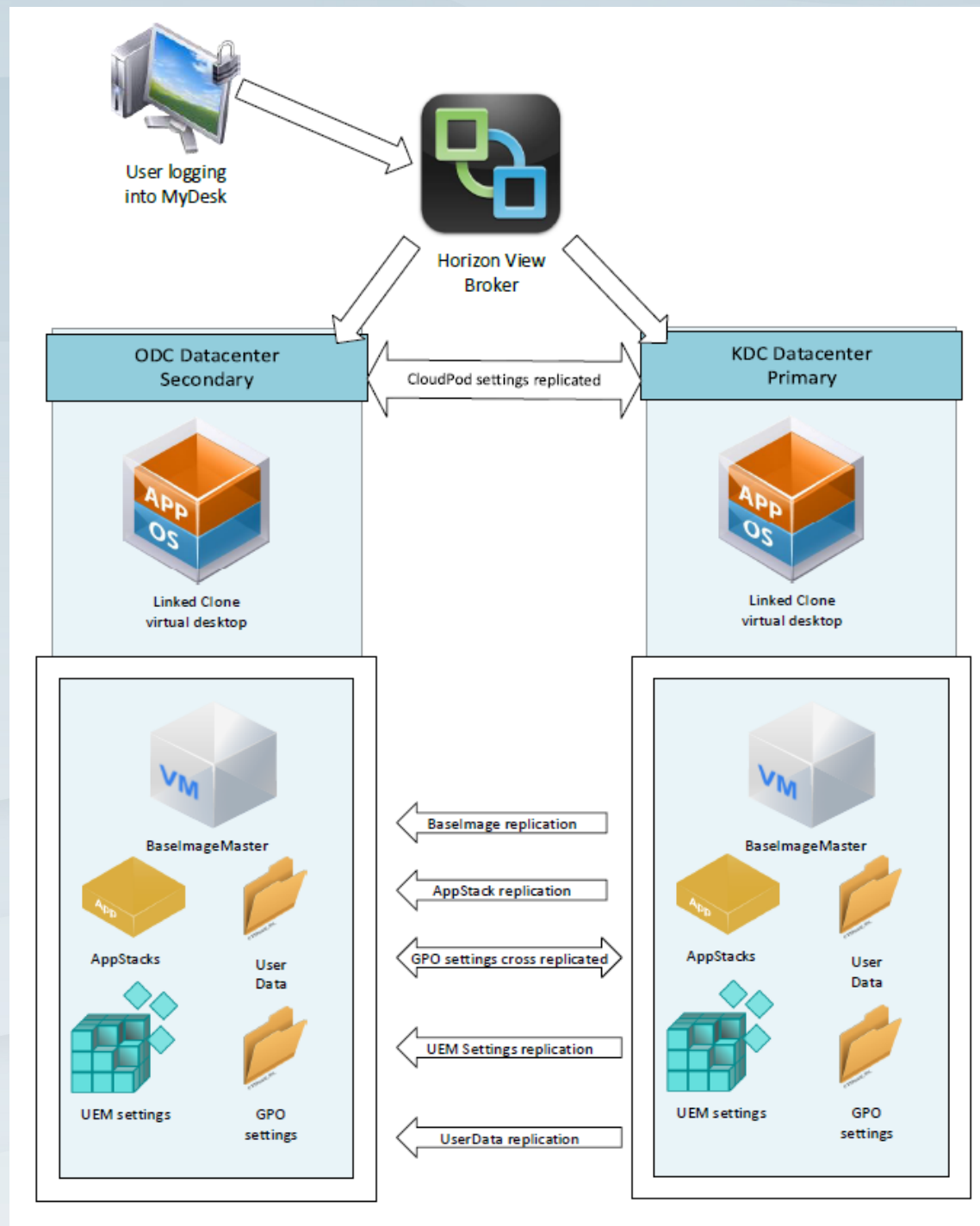


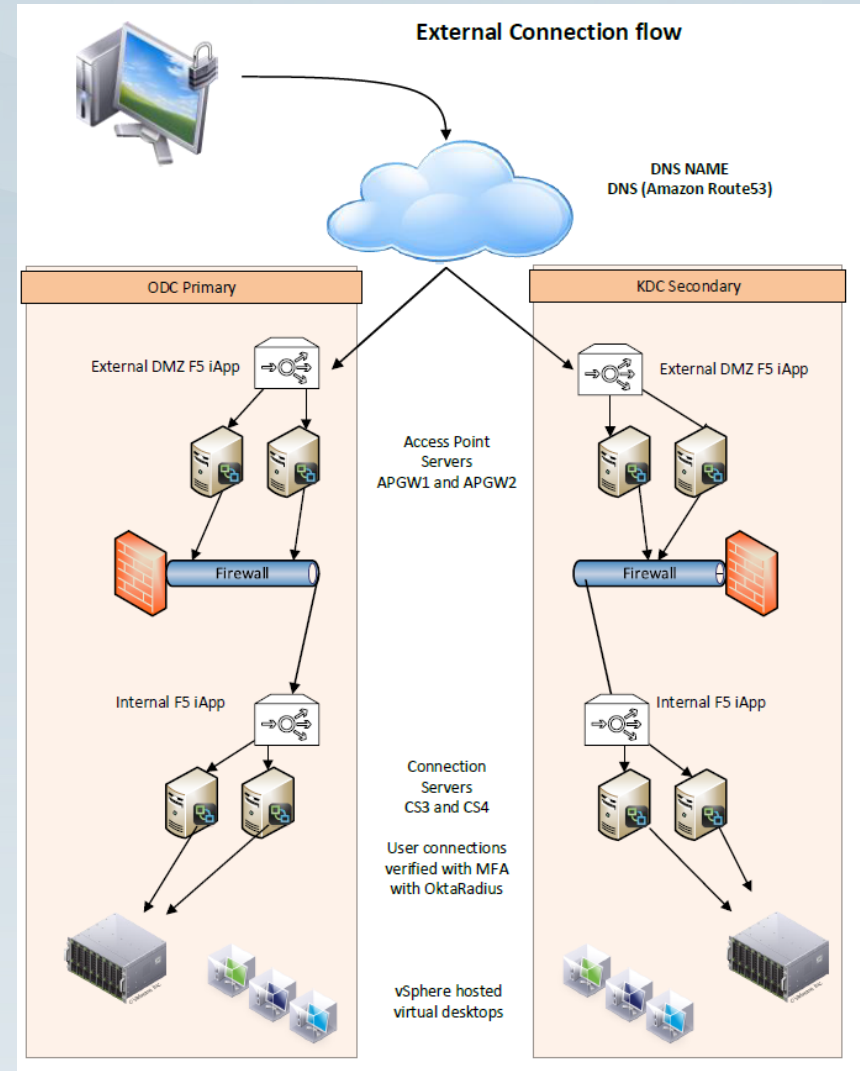
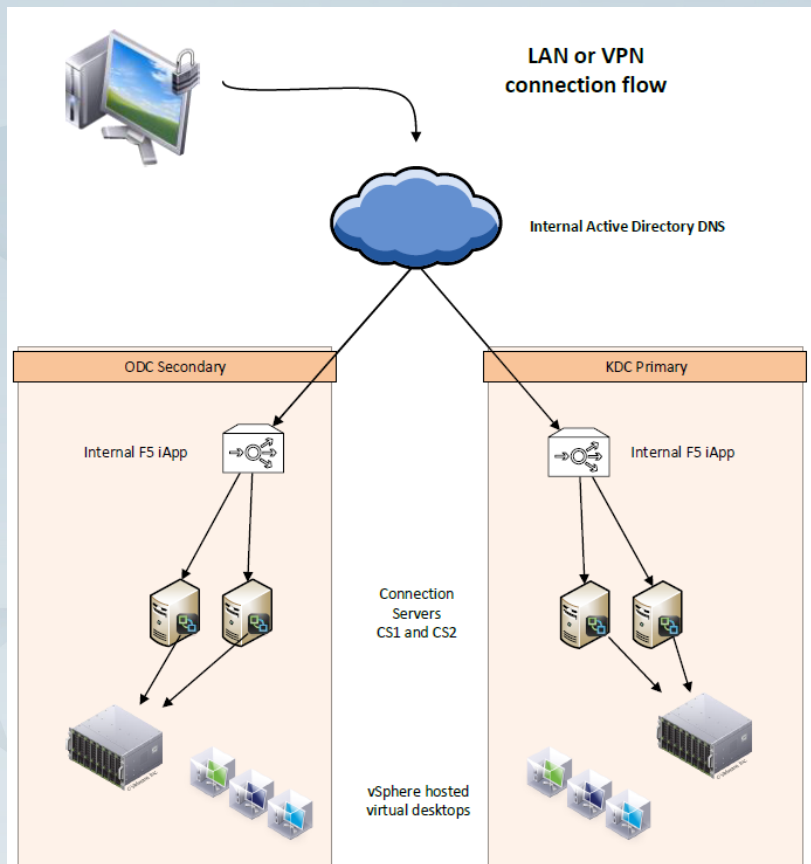
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Visio diagrams



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Login Request

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Steve.Massman@vu.com

07:23:53 AM
Jun 18, 2017

vu.okta.com

Columbia, Missouri, US

☒ Approve ☐ Deny

Details on latest survey and NPS

User comments from survey after moving to NVIDIA Tesla M10 cards

- Everything is running smoothly right now.
- It is very fast and still very easy to navigate. I do appreciate that the screen adjusts quickly to what ever desktop I am working on (1 screen at home or 3 screens at work).
- I can just disconnect, close my laptop, and take it home, then resume where I left off. No worries. Also, Encompass is faster.
- It is smooth. I noticed things do pull up quicker.
- VDI has improved over the last few months! Thanks for continuously making it more user-friendly!
- The speed and accessibility have been great! I've enjoyed being able to log in wherever I go and not worrying about whether or not i've got my laptop.
- Being able to keep a session up while traveling. Speed in Encompass.
- I think that it wont take long for everyone to adopt VDI and they will see more benefits than what they are currently using
- I always having my apps open we i go home and pop open my stuff :-)

NVIDIA environment upgrade process

- `esxcli system maintenanceMode set --enable true`
- `esxcli network firewall ruleset set -e true -r httpClient`
- `localcli hardware ipmi sel clear`
- `esxcli software vib list | grep -i nvidia`
- `esxcli software vib remove --vibName=NVIDIA-VMware_ESXi_6.5_Host_Driver`
- `esxcli software profile update -p ESXi-6.7.0-20181002001-standard -d`
`https://hostupdate.vmware.com/software/VUM/PRODUCTION/main/vmw-depot-index.xml --dry-run`
- `esxcli software vib remove -n ucs-tool-esxi`
- `esxcli software profile update -p ESXi-6.7.0-20181002001-standard -d`
`https://hostupdate.vmware.com/software/VUM/PRODUCTION/main/vmw-depot-index.xml`
- `esxcli network firewall ruleset set -e false -r httpClient`
- Reboot
- Website that maintains list of update releases and commands
 - <https://tinkertry.com/easy-update-to-latest-esxi>



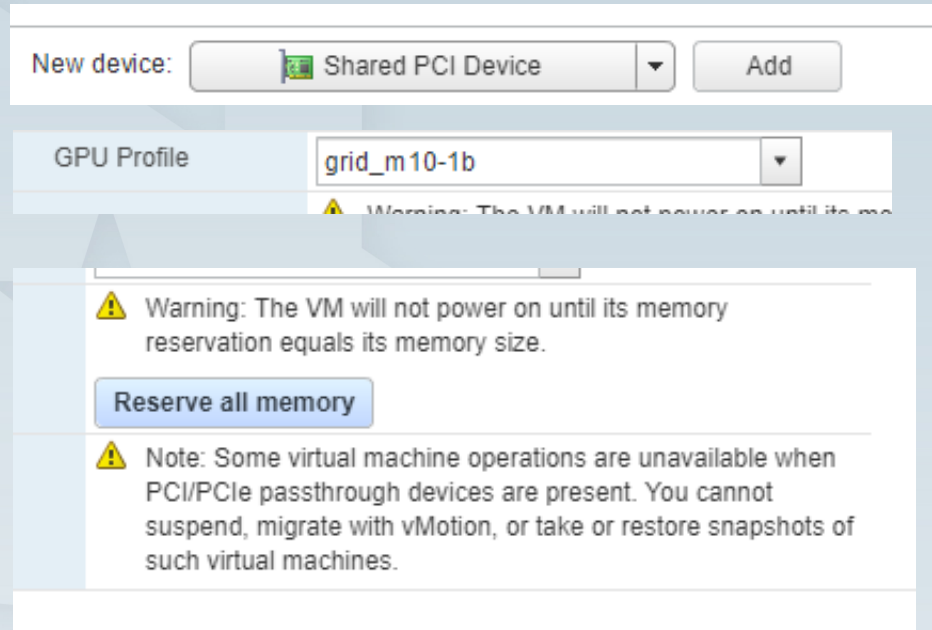
NVIDIA environment upgrade process

- `esxcli software vib list | grep -i nvidia`
- `esxcli software vib install --no-sig-check -v /vmfs/volumes/datastorexyz/NVIDIA/NVIDIA-VMware_ESXi_6.7_Host_Driver-410.91-1OEM.670.0.0.8169922.vib`
- `reboot`

- `esxcli system maintenanceMode set --enable false`
- `esxcli software vib list | grep -i nvidia`
 - Verifies that ESXi reports the driver installed
- `vmkload_mod -l | grep nvidia`
 - Verifies that kernel driver has been installed
- `nvidia-smi`
 - List driver version and GPUs available for virtual machines
- `dmesg | grep NVRM`
 - Look in logs to see if an issues have occurred

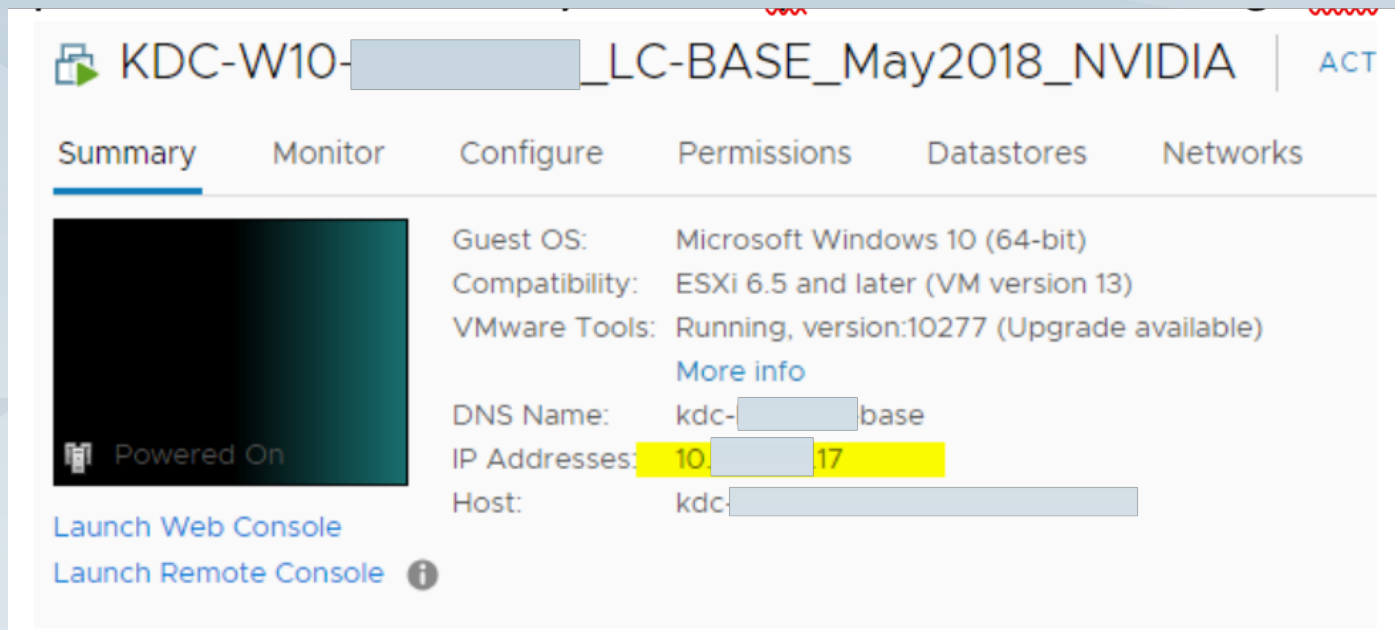


Adding NVIDIA GPU to base image

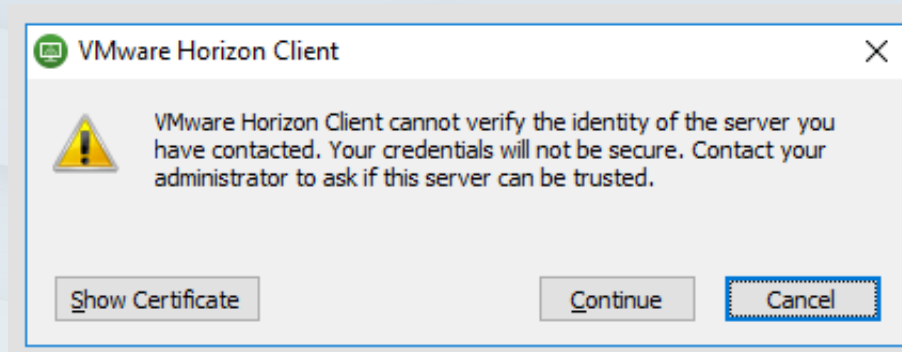


Shutdown virtual machine
Add shared PCI device
Boot virtual machine
Install Horizon direct connection agent
Install NVIDIA GRID drivers
reboot

Updating the base image



vmware-view.exe --serverURL ipaddress --desktopProtocol Blast --username adminacct --
desktoplayout windowsmall



Unique aspects to VDI with NVIDIA

- Memory consumption
- No virtual console connections
 - Need to use direct connection agent to update base image
- ESXi maintenance with linked clone pools
 - Have to evacuate VDI pools completely to reboot hosts

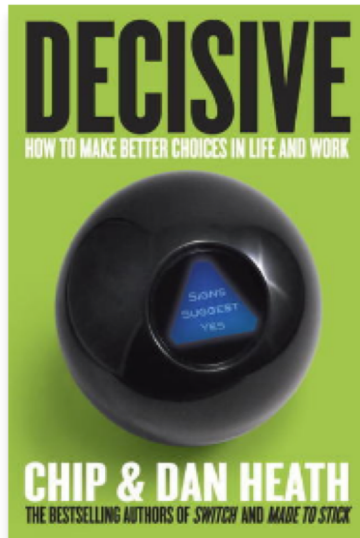


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Contributors to our Progress

1. Inspect and Adapt
2. Maintain Customer Satisfaction

Inspect and Adapt



✓ Read

My rating:



Decisive: How to Make Better Choices in Life and Work

by Chip Heath, Dan Heath

★★★★☆ 3.97 ·  [Rating Details](#) · 8,572 Ratings · 661 Reviews

The four principles that can help us to overcome our brains' natural biases to make better, more informed decisions -- in our lives, careers, families and organizations.

In *Decisive*, Chip Heath and Dan Heath, the bestselling authors of *Made to Stick* and *Switch*, tackle the thorny problem of how to overcome our natural biases and irrational thinking to make better decisions, ...[more](#)



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Maintaining Customer Satisfaction



Windows 7 -> Windows 10

Physical -> Virtual

Office 2010 -> 2013

Full Admin -> No Rights



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Key takeaways

- More why, less what and how
- Pull vs. Push
- Constant feedback from users
- The data's telling a story, are you listening?



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