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ALL IN

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The bridge to possible

Hybrid-Cloud Based VDI

The Benefits of Cloud and On-Premise for Your Business

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Senior Product Manager

PSOCLD-2013

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Cisco Webex App

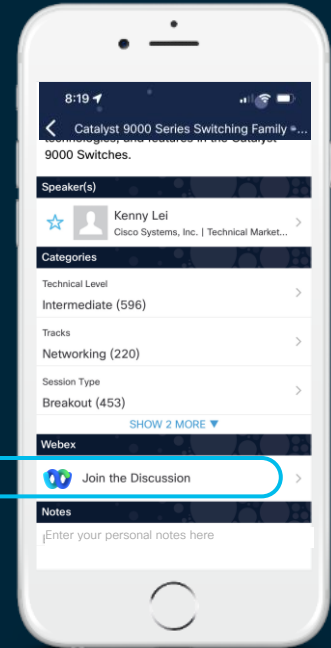
Questions?

Use Cisco Webex App to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until June 17, 2022.



<https://cicolive.ciscoevents.com/cicolivebot/#PSOCLD-2013>



Agenda

- Market Explosion for VDI
- Building Blocks to VDI Design
- Latest Cisco Designs
- Hybrid Cloud Use Cases
- AMD, GPU, Persistent Memory
- Why Choose Cisco – Next Steps

What Exactly is Virtual Desktop Infrastructure (VDI)?



Desktop Broker/AD/SQL/Load Balancers

Virtual Machine Manager/Cluster Manager

Hypervisor



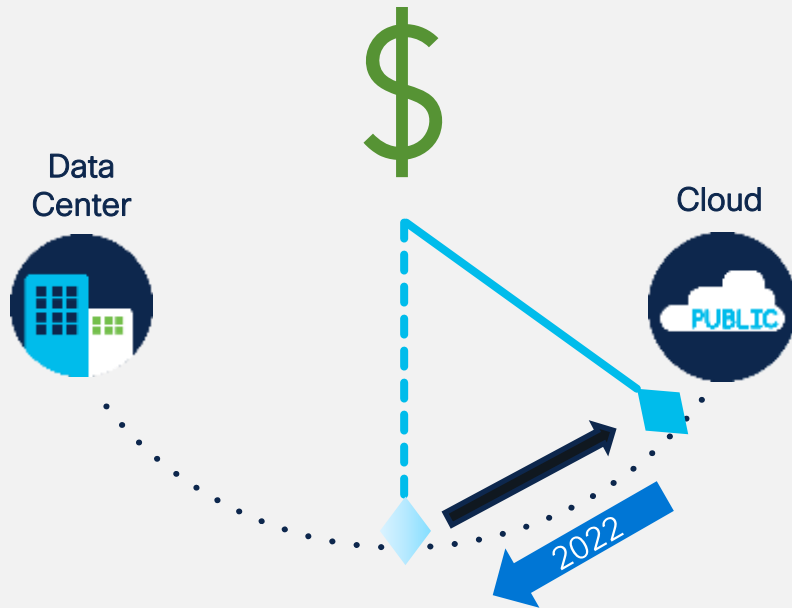
Cisco C245 M6

Top IT Benefits:

- Simplified image management
- Access anywhere, any time, on any device
- Brings user closer to the data
- Fast application deployment/upgrade
- Reduced IP loss risk
- Enhanced security
- Simplified backup, patching, and management
- Instant provisioning of new desktops

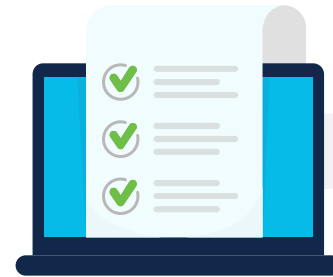
COVID-19: Forced IT to Enable Remote Workers IMMEDIATELY!

The Pendulum Swung to the Cloud



Why?

- Immediate access
- Consistent end-user experience
- Easy and efficient desktop management
- Data is secure
- Access from any Wifi connection point
- Leverage prior cloud expertise
- Belief that only a short-term solution was needed ☺
- Pricing was reasonable!?



Cloud Implementation Can Have Issues

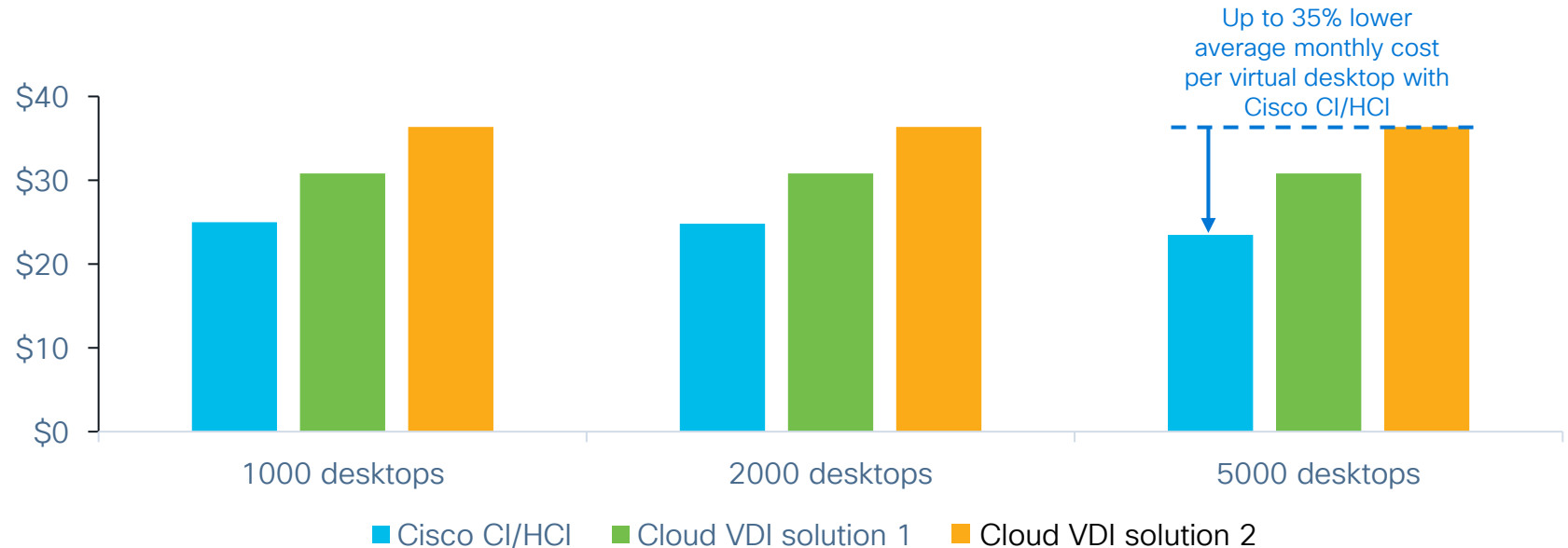
- Pricing far higher than forecasted.
- Some industries limit specific data in a cloud.
- Security profile may not match desired settings.
- Loss of direct management control.

According to Gartner 2020, after COVID-19
48% of remote workers will stay partially remote.*

Is the Cloud the long-term VDI infrastructure
solution to enable your remote workers?

ESG Analysis: Lower VDI Costs with Cisco CI/HCI Solutions

Cisco CI/HCI solutions compared to cloud-based VDI solutions

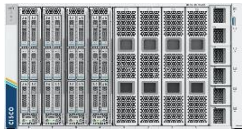


Source: <https://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/desktop-virtualization/esg-white-paper-cisco-hci-vdi-economics-nov2020.pdf>

Cisco VDI Solution Architecture Overview



Cisco UCS X-Series



UCS Converged Infrastructure Solutions



HyperFlex Systems



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User Profiles



Verticals



Financial



Engineering



Manufacturing



Education



Healthcare



Geospatial



Oil and Gas

Applications



Desktop Virtualization Platform

Citrix Virtual Apps and Desktops
(formerly XenApp and XenDesktop)



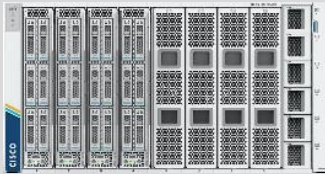
vmware Horizon



UCS Hardware Portfolio

UCS Chassis

UCS X-Series



UCS 5108



Enterprise Performance

Intel Servers

C240 M6



2S, 80 Cores
8TB DDR4 Memory
28 SFF/16LFF, up to 26 NVMe

2U
Servers

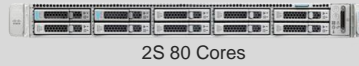
AMD Servers

C245 M6



2S, 128 Cores
8TB DDR4 Memory
28 SFF, up to 8 NVMe

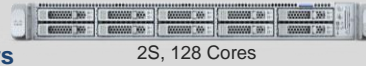
C220 M6



2S 80 Cores
8TB DDR4 Memory
10 SFF/10 NVMe

1U
Servers

C225 M6



2S, 128 Cores
8TB DDR4 Memory
10 SFF/10 NVMe

C240SD M5



2S, 56 Cores
Up to 768GB DDR4 Memory
2 NVMe or 6 NVMe/SATA chassis option

Specialty
Servers

C4200/C125



4 Node/2S Each – 128 Cores/Node
16 DIMM Slots per node
SAS/SATA/NVMe drives

B200 M6



2S, 80 Cores
8TB DDR4 Memory
2 SFF or 4x M.2 SATA

Blade
Servers

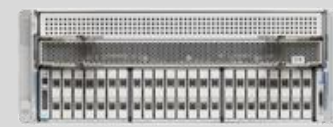
X210c M6



2S, Intel 3rd Gen CPU
32 DDR4 3200MHz Memory
6 SAS/SATA/NVMe

Intensive/Mission Critical

C480 M5 ML



2S, 56 Cores
Up to 3TB DDR4
Memory
24 SFF, 6 NVMe
8 SMZ1 V100 GPUs

C480 M5



4S, 112 Cores
Up to 12TB DDR4
Memory
32 SFF/NVMe
10 GPUs

B480 M5



4S, 112 Cores
Up to 12TB DDR4
Memory
4 SFF, 4 GPUs

UCS X-Series Enables Flexible VDI Solution Design

Supports All-In-One Design Up To Large Converged Infrastructures



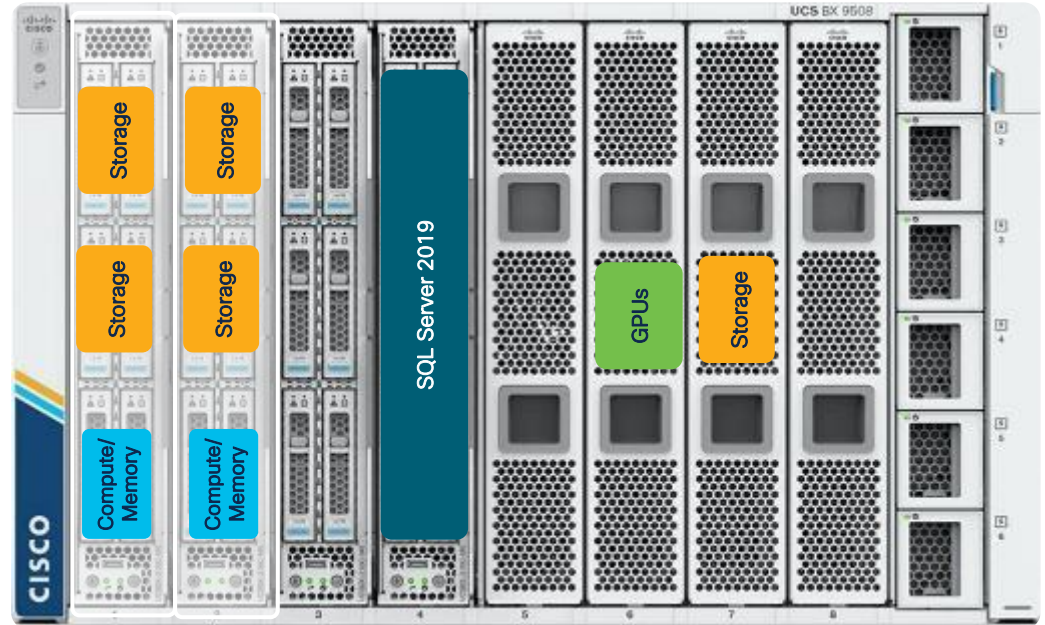
Future Possibilities

Horizon 7
Horizon 8

Possible Use Case: Branch Locations

- Number of locations
- Branch specific personnel/apps
- Accommodate branch expansion
- Security differences/branch
- Need to accommodate centralized workloads or databases

Only Cisco UCS X-Series is future designed to meet today's challenges and tomorrow's goals!



Back
Up

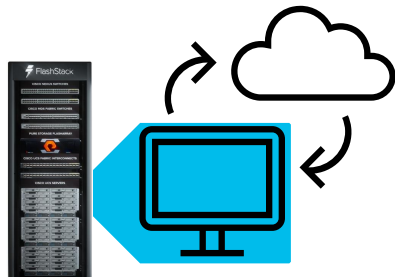
Cisco VDI Proof Points For Cisco UCS X-Series



FlashStack X-Series Hybrid Cloud for VDI



Run



- CVD – Horizon 8 on vSphere 7
- Test with AWS & Azure
- Hybrid Cloud Use Cases:
 - Data Tiering
 - Disaster Recovery
 - Cloud Burst
- Test (2) Nvidia T4 GPU on X210c
- Test GPU Compute Node

Converged Infrastructure – Datacenter FlexPod with X-Series for Citrix



Walk



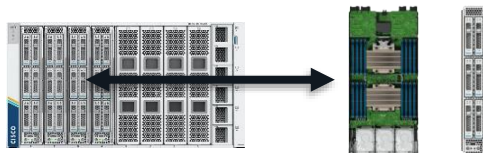
- Document 2,500 Knowledge Workers
- Citrix LTSR on VMware vSphere 7
- CVD – Design/Deployment documented
- Expected GA – Late March 2022

[CVD](#)

X210c M6 Server Characterization



Crawl



- Size VDI on several Intel Processors
- Test both Citrix LTSR, Horizon 8
- Verify server sizing metrics
- Document proper set up X210c M6

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Cisco Validated Designs for VDI

Proven Solutions to Implement In Your Data Center



Cisco
Validated
Design



Selected Customer Engagements

Gather end-to-end requirements

Product Development

Integrated solution

Integrated
Systematic
Approach

Thought Leadership

Incorporate best practices

Tested and Validated

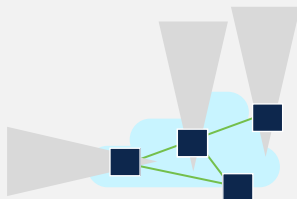
For consistent delivery by partners

System development guidelines

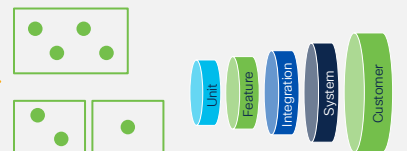
Planning



Design



End-to-End validation



Documentation



300-500 pages/CVD

Cisco Support Stands Behind All CVD's - Even If an Engineer Must Go On-Site

FlexPod Express VDI Solutions Examples

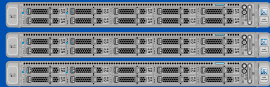
Ideal M6 Based Designs for Small Business or Departmental Deployments

FlexPod Express Small:

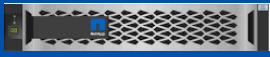
Support up to 95 Remote Workers*

- (3) Cisco C220 M6S Servers
 - 128 GB per server
 - (2) 16-core 3rd Gen Intel® Xeon® Processor Scalable Family
- (2) Nexus 31108-VXLAN, 48 x SFP+ and 6C/6Q QSFP ports
- Intersight Essentials 1yr, 1yr SupportNet 24X7X4
- NetApp A220

Cisco C220 M6



NetApp A220

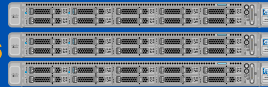


FlexPod Express Medium:

Support up to 190 Remote Workers*

- (3) Cisco C220 M6S Servers
 - 256 GB per server
 - (2) 16-core 3rd Gen Intel® Xeon® Processor Scalable Family
- (2) Nexus 31108-VXLAN, 48 x SFP+ and 6C/6Q QSFP ports
- Intersight Essentials 1yr, 1yr SupportNet 24X7X4
- NetApp A250

Cisco C220 M6



NetApp A250



FlexPod Express Large:

Support up to 575 Remote Workers*

- (1) Cisco 5108 Chassis, (6) B200 M6 Blades
 - 384 GB per server
 - (2) 16-core 3rd Gen Intel® Xeon® Processor Scalable Family
- (2) Nexus 31108-VXLAN, 48 x SFP+ and 6C/6Q QSFP ports
- Intersight Essentials 1yr, 1yr SupportNet 24X7X4
- NetApp A250 + 8 Disks

Cisco 5108
w/B200 M6



NetApp A250



*Remote Worker = A Knowledge or Professional Worker sized with 4GB per user.

Choose either Citrix or VMware Horizon as your VDI broker.

All configs do not enable failover or more commonly called N+1 failover.

FlexPod Express VDI Solutions Examples

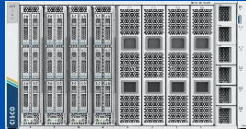
Ideal M6 Based Designs for Small Business or Departmental Deployments

FlexPod Small:

Support up to 500 Remote Workers*

- (3) Cisco UCS X210c M6 Servers
 - 1 TB of memory per server
- (2) Intel 28-core 2.6 GHz Intel® Xeon® Gold (6348) per Compute node
- (2) Nexus 93180YC-FX
- Intersight Advantage 1yr, 1yr SupportNet 24X7X4
- (1) NetApp AFF A400

UCS X9508 Chassis with
8 Cisco X210c M6 nodes



NetApp AFF A400

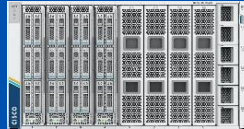


FlexPod Medium:

Support up to 1000 Remote Workers*

- (6) Cisco UCS X210c M6 Servers
 - 1 TB of memory per server
- (2) Intel 28-core 2.6 GHz Intel® Xeon® Gold (6348) per Compute node
- (2) Nexus 93180YC-FX
- Intersight Advantage 1yr, 1yr SupportNet 24X7X4
- (1) NetApp AFF A400

UCS X9508 Chassis with
8 Cisco X210c M6 nodes



NetApp AFF A400

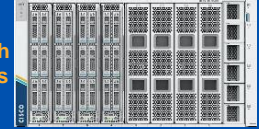


FlexPod Large:

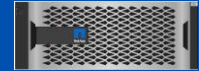
Support up to 2500 Remote Workers*

- (8) Cisco UCS X210c M6 Servers
 - 1 TB of memory per server
- (2) Intel 28-core 2.6 GHz Intel® Xeon® Gold (6348) per Compute node
- (2) Nexus 93180YC-FX
- Intersight Advantage 1yr, 1yr SupportNet 24X7X4
- (1) NetApp AFF A400

UCS X9508 Chassis with
8 Cisco X210c M6 nodes



NetApp AFF A400



*Remote Worker = A Knowledge or Professional Worker sized with 4GB per user.

Choose either Citrix or VMware Horizon as your VDI broker.

All configs do not enable failover or more commonly called N+1 failover.

Converged Infrastructures for VDI

A complete system with all elements documented via a Cisco Validated Design testing a specific VDI Broker demonstrating best practices showing performance, availability, and automation. Supported by both Cisco and the selected storage partner.



Cisco & NetApp FlexPod

Most versatile and best selling
converged infrastructure

Benefits:

- Less time to implement
- Lower total costs
- Improved performance
- Improved confidence
- Cisco & storage partner support
- Piece of mind and confidence

Broker	Hypervisor		
	VMware vSphere	Citrix Hypervisor	Hyper-V
Citrix virtual apps and desktops	✓	✓	✓
VMware Horizon	✓		



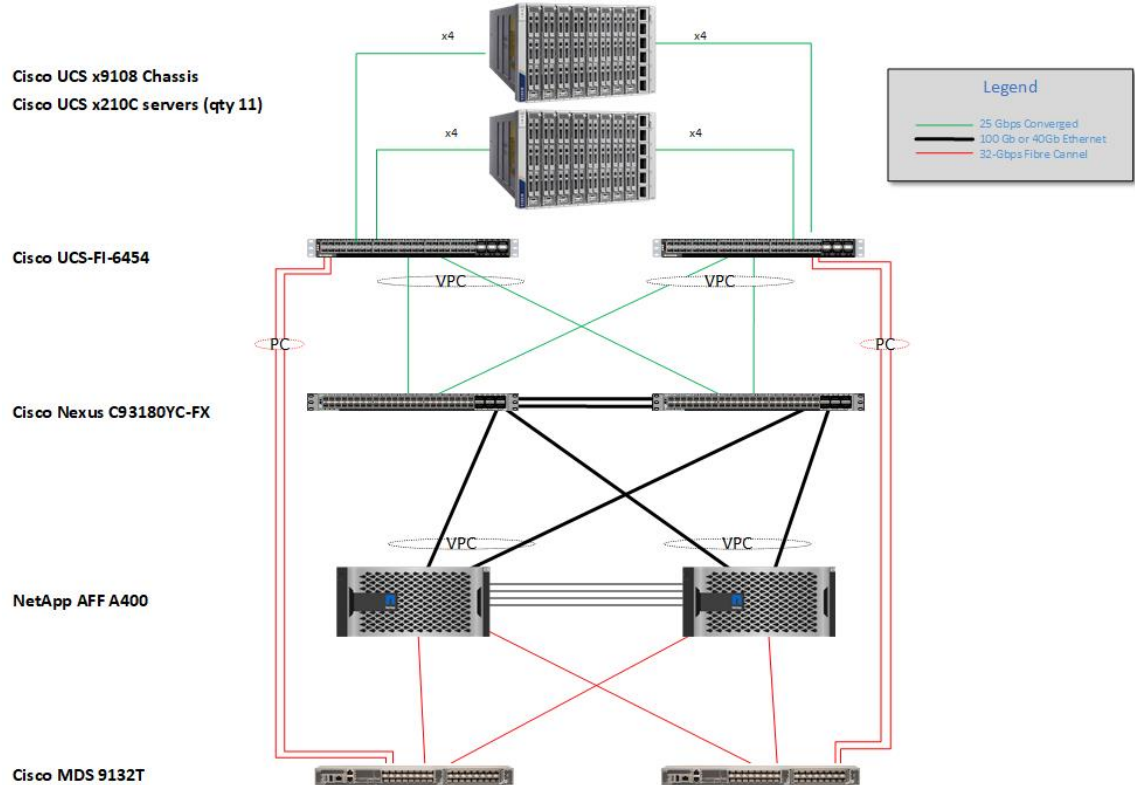
Cisco & Pure Storage FlashStack

Innovative all-flash solution for
business critical workloads


X-Series Based Converged Infrastructure With Citrix LTSR Running VMware vSphere 7 Supporting up to 2500 Knowledge Workers or 3000 Task Users

Converged Infrastructure Benefits:

- Less time to implement
- Lower total costs
- Improved performance
- Improved confidence
- Cisco & storage partner support
- Piece of mind and confidence
- Leverages many years of system design for VDI solutions
- Fully documented in Cisco Validated Designs

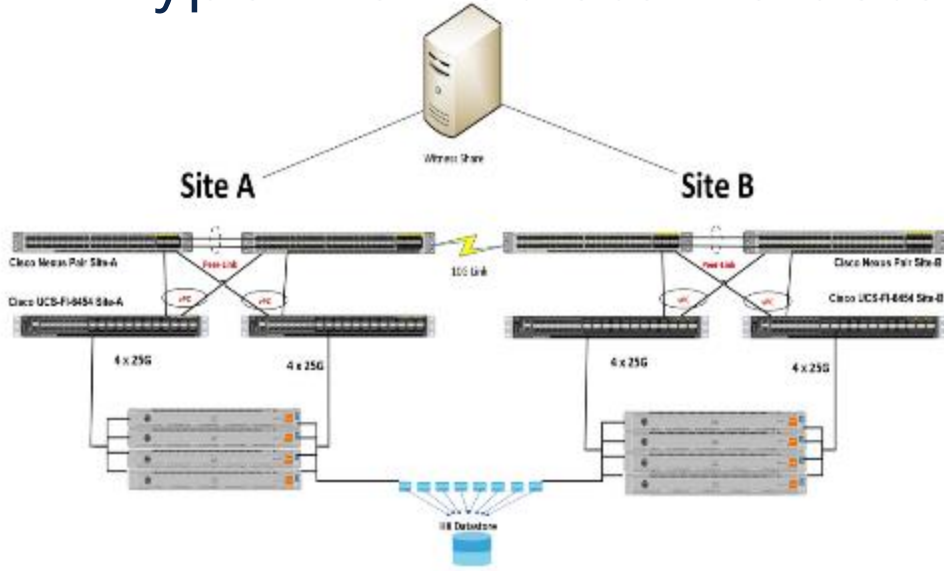


Component details documented in [Cisco Validated Design](#)



Customers now indicate scaling up to 2,500 desktops per cluster, down from 5,000 due to provide high availability.

HyperFlex Stretch Cluster Architecture For VDI



Business Challenges

- Concerns due to inconsistent cooling in the datacenter, system viewed as single point of failure, threat of natural disasters.
- Desire proof of system resiliency before investing.
- Looking at extending system to a campus-wide deployment to address HA concerns and meet company or regulatory requirements.

Technical Highlights

- 8x UCS HX220-M5S rack servers, 4 on each site for compute (n+1) with scale out option in a single UCS domain
- Cisco HyperFlex 4.0(2a), UCSM 4.0.4(g)
- Citrix Virtual Apps & Desktops 1912 LTSR on VMware ESXi 6.7 U3

Hypervisor

Broker	VMware vSphere	Citrix Hypervisor	Hyper-V
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Citrix virtual apps and desktops



VMware Horizon

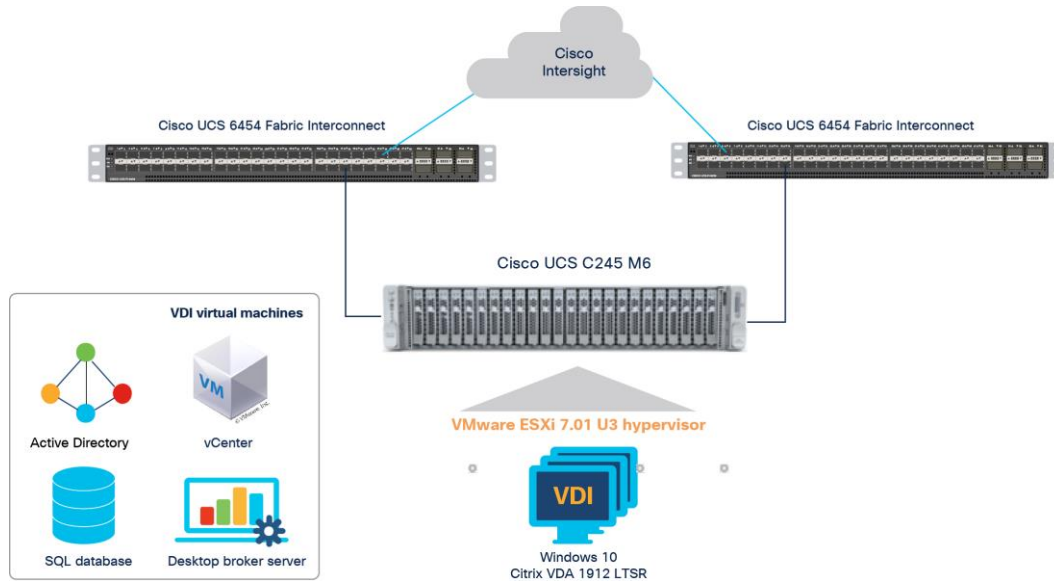


Cisco Validated Design

Summary

- First HX Stretch Cluster design for VDI workloads.
- Functional verification HX deployed as a stretch cluster with 10G link simulated testing, including ability to withstand a site-wide failure.
- Scalable and resilient virtual environment with documented best practices.

Citrix Server Characterization on C245 M6



C245 M6 Server Configuration:

- (1) AMD EPYC 7713 processor (64 cores at 2 GHz with 225 watts (W) and 3200-MHz for memory)
- 2 TB Memory

Test Goals:

- Determine optimum price to performance ratio for two types of Knowledge Worker configurations
- Determine which system resource is exhausted first
- All testing performed using Login VSI

The software components:

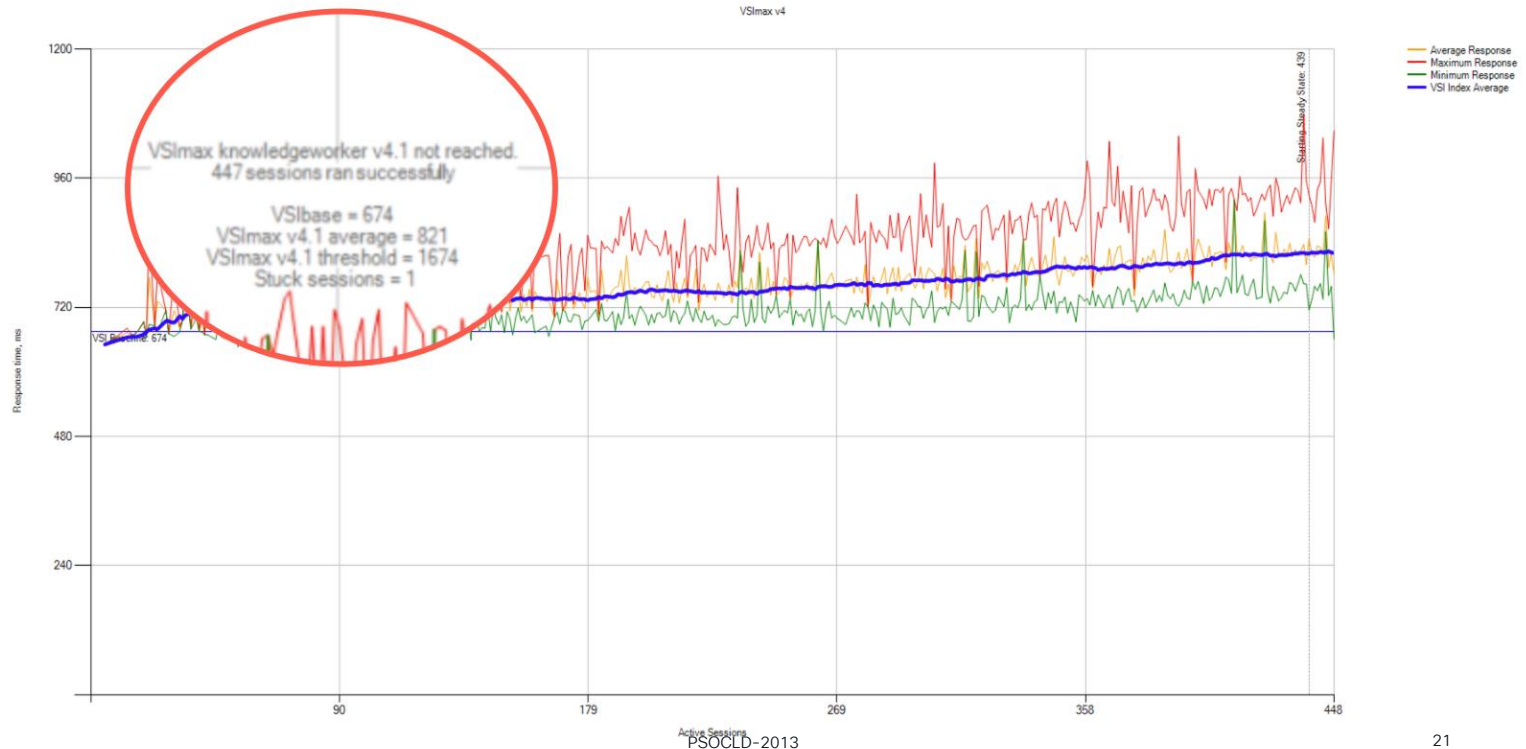
- Citrix Virtual Apps and Desktops 1912 LTSR CU3
- VMware ESXi 7 U3 for VDI
- Cisco UCS Firmware Release 4.2(1c)
- Microsoft Windows 10 64-bit
- Microsoft Windows Server 2019 for RDS
- Microsoft Office 2016

Citrix Server Characterization on C245 M6

[Whitepaper](#)

Combination	Virtual CPU	Memory	Virtual NIC
Knowledge worker: Microsoft Windows 10	2 vCPUs	4 GB of memory	1 x 40-GB vNIC

- 447 of 450 Users successful
- Memory exhausted first
- CPU utilization peak 55%

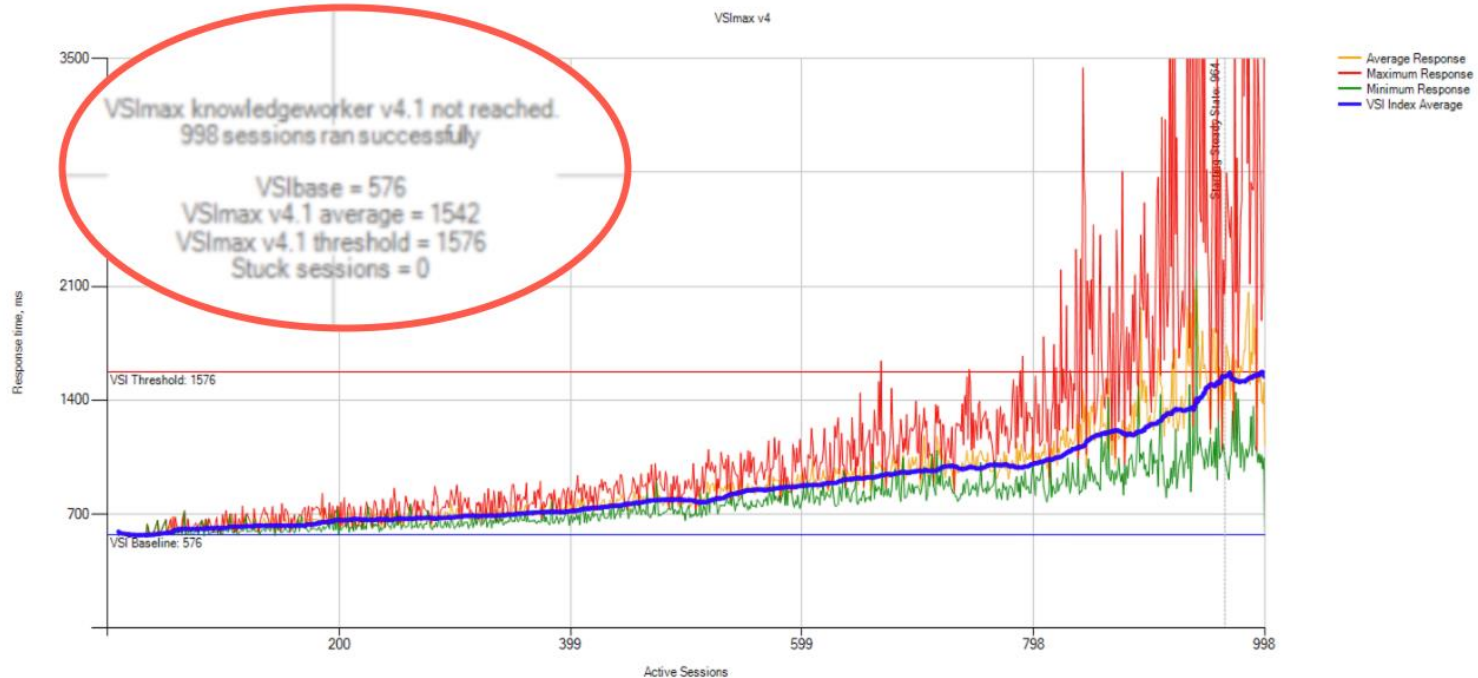



Citrix Server Characterization on C245 M6

[Whitepaper](#)

Combination	Virtual CPU	Memory	Virtual NIC
Knowledge worker: Microsoft Windows Server 2019	8 vCPUs	32 GB of memory	1 x 40-GB vNIC

- 998 of 1000 Users successful
- Memory exhausted first
- CPU utilization peak 90%

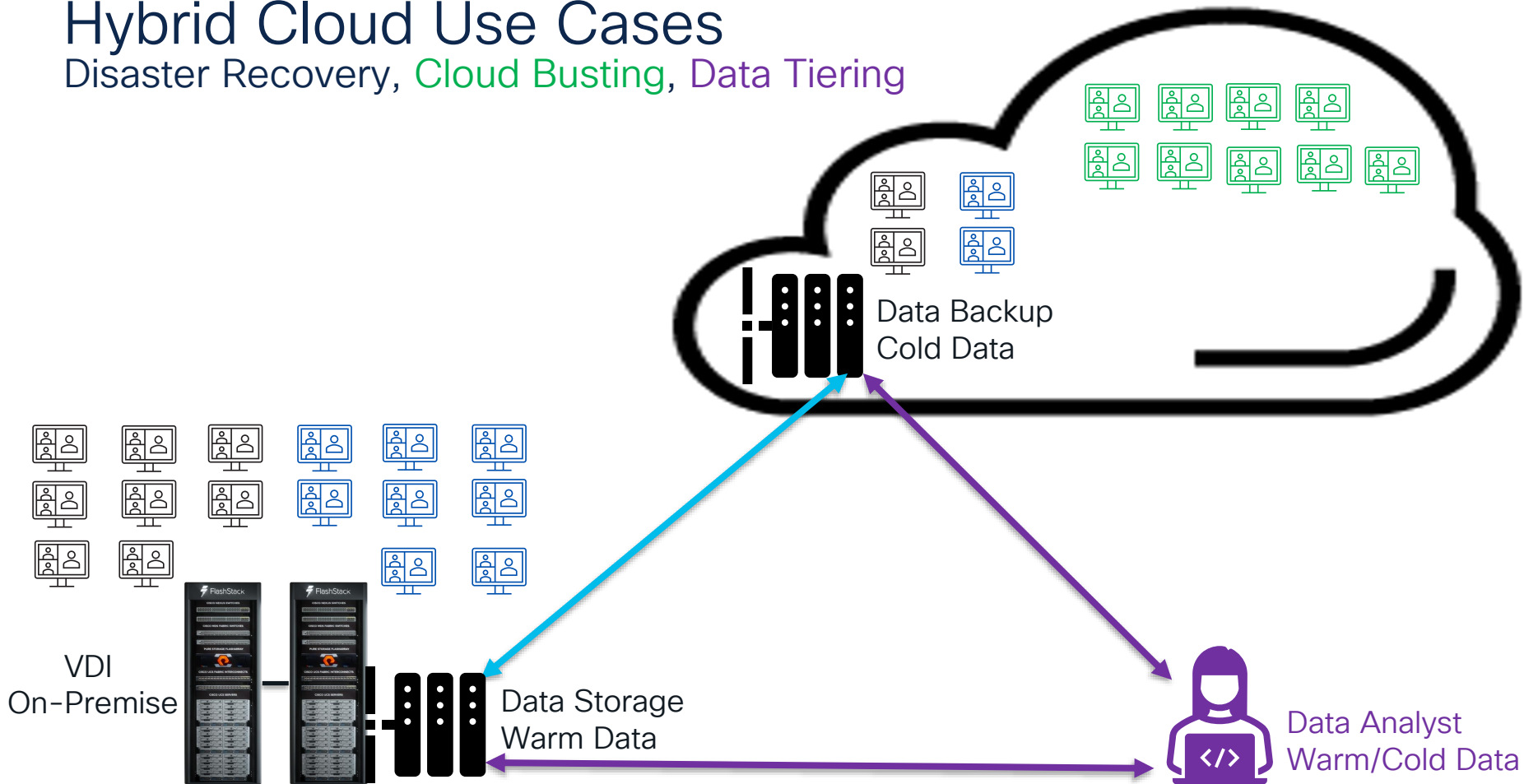




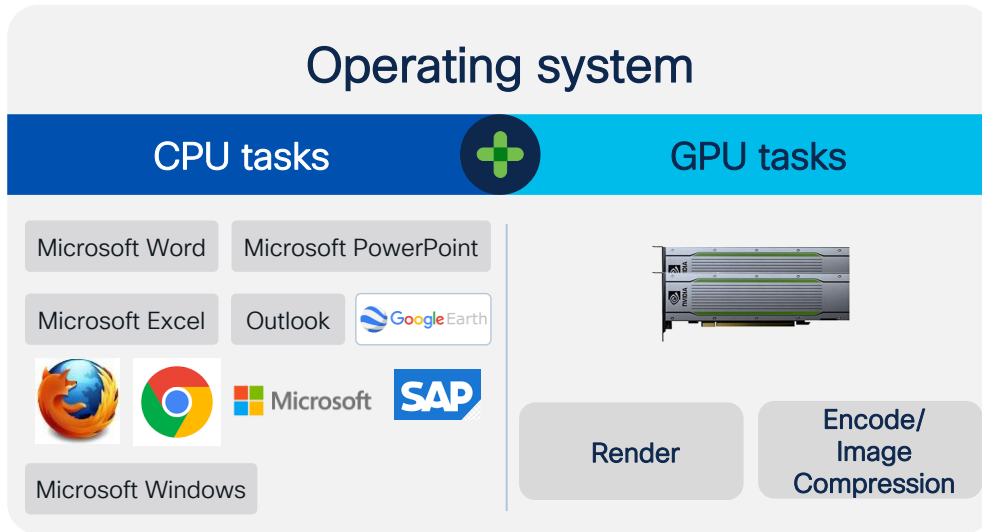
Just because you can put 447 or
998 desktops on a single server,
should you?

Hybrid Cloud Use Cases

Disaster Recovery, **Cloud Busting**, **Data Tiering**

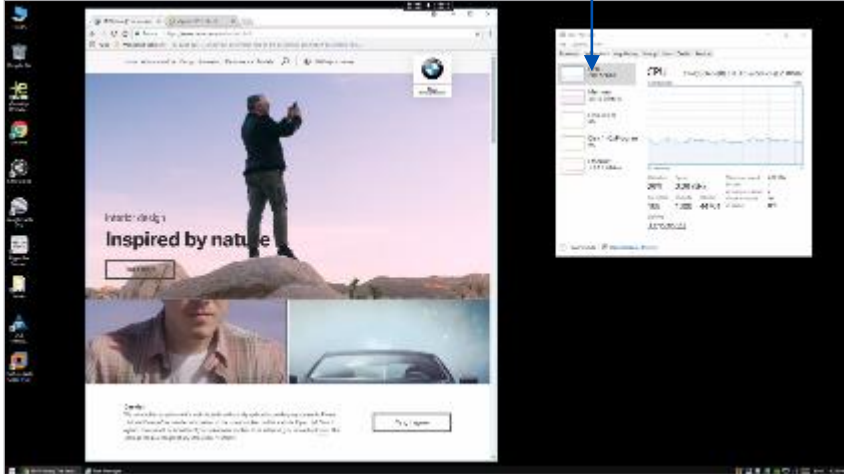


CPU vs GPU Tasks

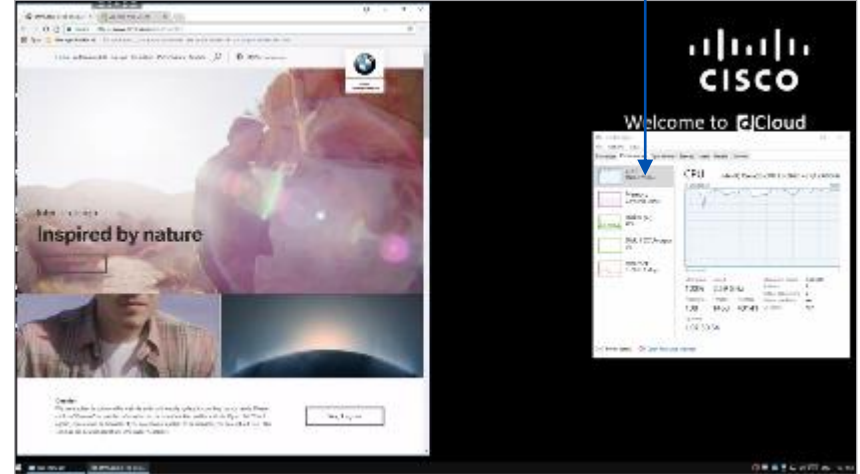


Windows 10 vGPU Comparison: BMW.com

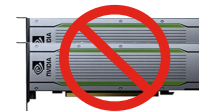
CPU usage normalized at ~29% with vGPU



CPU usage normalized at ~99% without vGPU



- Windows 10 Build 1607
- 2x vCPUs
- 4GPU RAM



Data Center & Edge PCIe Products

Choose the right GPU for the job



DL Training



Scientific Research



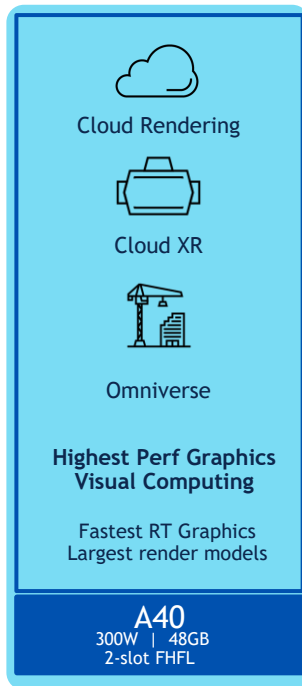
Data Analytics




Highest Perf Compute
AI, HPC, Data Processing

Fastest Compute, FP64
Up to 7 MIG instances


A100
250W & 300W | 40G & 80G
2-slot FHFL




Cloud Rendering



Cloud XR



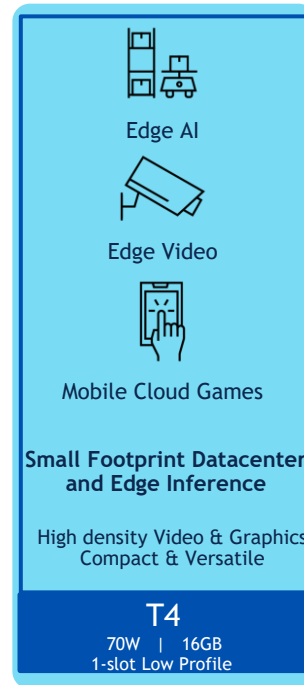
Omniverse




Highest Perf Graphics
Visual Computing

Fastest RT Graphics
Largest render models


A40
300W | 48GB
2-slot FHFL



Edge AI



Edge Video



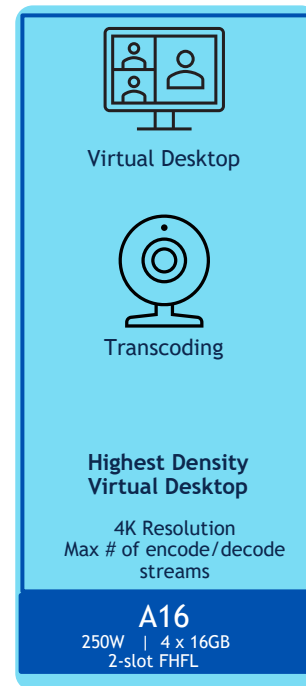
Mobile Cloud Games




Small Footprint Datacenter
and Edge Inference

High density Video & Graphics
Compact & Versatile


T4
70W | 16GB
1-slot Low Profile



Virtual Desktop



Transcoding



Highest Density
Virtual Desktop

4K Resolution
Max # of encode/decode
streams

A16
250W | 4 x 16GB
2-slot FHFL

Compute

Graphics

Cisco GPU Platforms Offering For VDI

Racks

C220 M5



2x NVIDIA T4

C240 M5



2x NVIDIA M10
6x NVIDIA T4

C480 M5



3x NVIDIA M10
9x NVIDIA T4
6x NVIDIA A40

C220 M6 C225 AMD



3x NVIDIA T4

C240 M6 C245 AMD



3x NVIDIA A100 40GB (PCIe)
up to 3x NVIDIA A40
up to 3x NVIDIA A16
up to 3x NVIDIA A100-80GB (PCIe)

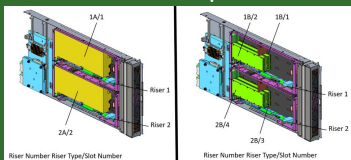
X-Series

X210c M6



2x NVIDIA T4
GPU/blade

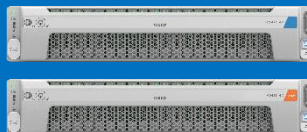
X440p



Riser A - 2x A16, A40 or A100
Riser B - 4x T4

HyperFlex

HX 240C M5



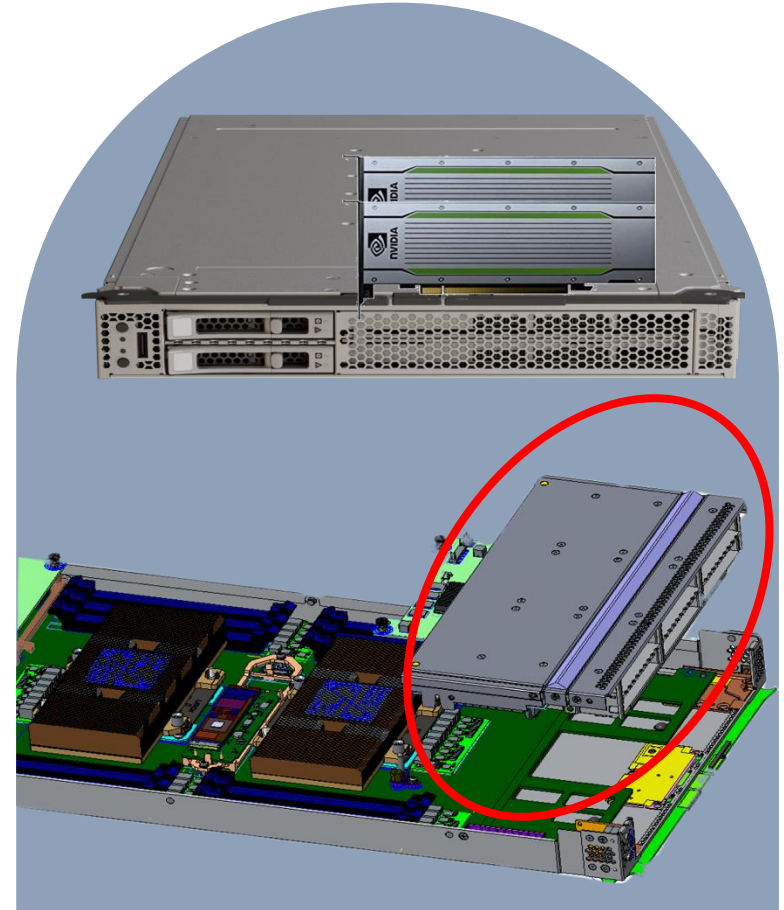
2 X NVIDIA M10
2x NVIDIA V100
6x NVIDIA T4
2x NVIDIA A100-40GB

HX 240C/245C M6

3x NVIDIA A100-40GB(PCIe)
up to 3x NVIDIA A40
up to 3x NVIDIA A16
up to 3x NVIDIA A100-80GB (PCIe)

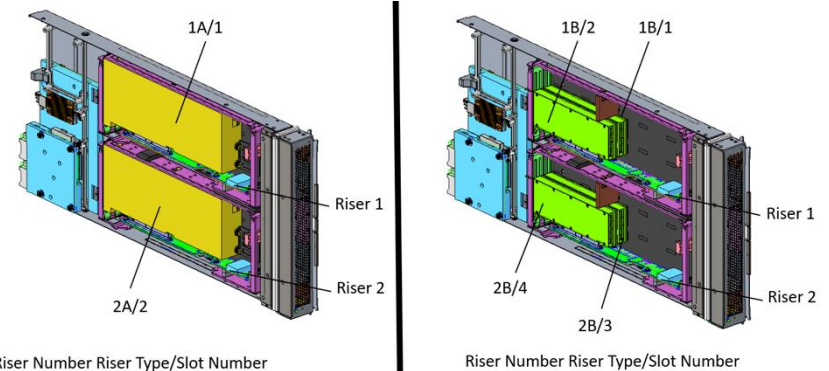
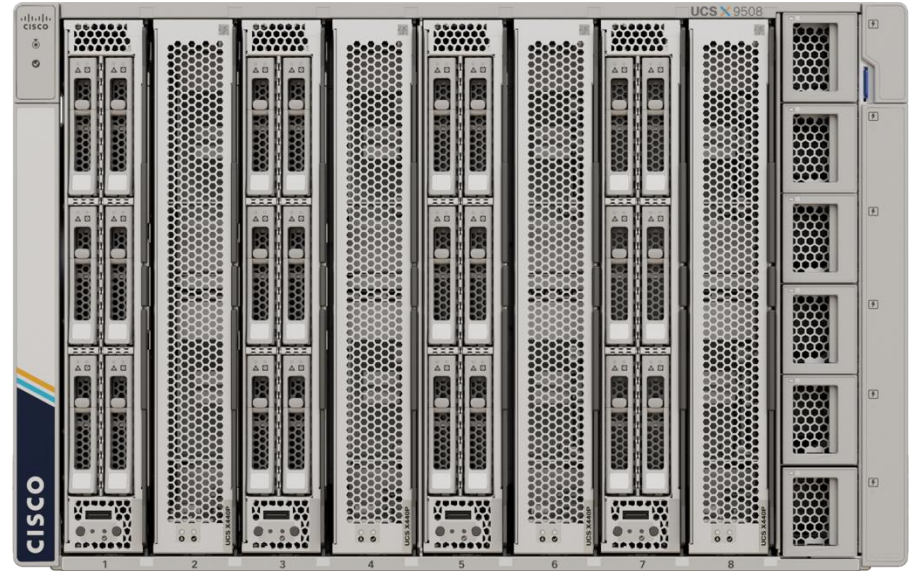
X210c GPU Front Mezz


- UCSX-X10C-GPUFM
- Two PCIe Gen4 x8 HDDL slots
 - One or two NVIDIA T4 GPUs supported
 - Requires PID UCSX-GPU-T4-MEZZ
- Up to two U.2 NVMe Drives
 - 4x PCIe Gen4 Per Drive
 - No SAS/SATA Support
 - Intel VROC Capable with Intel Drives



X440p PCIe Node

- The X440p PCIe node provides 2 or 4 PCIe slots connected to an adjacent compute node
- Includes two riser cards, type A or B
- Riser A – Up to two dual width GPUs
 - A16, A40, or A100
- Riser B – Up to four single width GPUs
 - T4
- No mixing of GPU models on a server





VDI performance is equal whether you
configure memory with DIMMs or
PMEM.

[Cisco Whitepaper](#)

Customer Case Studies

Machine Manufacturing



Goal: Allow engineers to work from anywhere, solve load time for complex 3D models

Outcomes

- **Reduced the time required to open complex design files by 80%**
- Allowed engineers to work on multiple projects simultaneously while eliminating the need for dedicated workstations
- Enabled engineers to show customers actual, 3D models of product design

Auto Manufacturing

DENSO



Goal: Improve engineer and designer efficiency with virtual workstations

Outcomes

- Increased productivity by consolidating the boot environment in which engineers work
- **Saw a 250% increase in use of the VDI environment**
- Provided a complete virtual desktop, enabling engineers and designers to work and collaborate remotely

AEC

CANNONDESIGN



Goal: Deliver better services to sites nation-wide

Outcomes

- **Higher user density at 2x performance**
- **13x improvement in 3D software performance benchmark scores**
- 13.5 hours per week in employee time saved, equating to approximately \$2,500 per week in billable hours
- **85% reduction in server space**
- Agile IT response to new business requirements, add new users on the fly

Why Partner with Cisco for VDI

Expertise with the leading VDI Brokers



Years of experience with both Citrix and VMware Horizon

Designs tested, documented, and fully supported



Cisco Validated Designs, Whitepapers, Cisco TAC

Select from a range of system design possibilities



Your Choice of Converged Infrastructure or HyperFlex

Management capabilities to ensure uniform server setup, automatic failover, and proactive support



UCS Manager, Service Profiles, and Cisco Intersight

Design able to withstand multiple system failures



Servers, Fabric Interconnect, MDS Switch can all fail, but remote users can still work

Easily scale beyond your growth targets



Tested to 5,000 Remote Workers, easily scale to 1,000's more

Factor in support for intense graphical applications



Incorporate latest Nvidia GPU, Certified for use by Dassault

Deliver tools to improve your data center security



Add Tetration, AppDynamics, and related tools provide security

Ability to implement hybrid cloud VDI



Extend your VDI design to incorporate cloud capabilities to meet your unique VDI challenges

VDI Resources For More Information



VDI Resources



Cisco VDI info

www.cisco.com/go/vdi

CVD tool

www.cisco.com/go/vdi-cvd

Cisco-Citrix portal

<https://www.accelerateandsimplify.com/workspace/>

Cisco-VMware portal

www.empoweringyourdigitalworkspace.com

Cisco-NVIDIA portal

www.nvidia.com/cisco-vdi

Next Steps – Questions?

Cisco has the experience, proven designs, strong partnerships, all tested and documented in Cisco CVDs for your hybrid cloud VDI deployments.

We stand ready to serve.

Thank you for attending today's presentation!



Request a detailed system sizing **today**.

Simply contact your Cisco representative or one of our valued business partners!

For more server information, visit

<https://www.cisco.com/go/vdi>



Technical Session Surveys

- Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live branded socks!
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Subscription-based product, technology, and certification training

Cisco Modeling Labs

Network simulation platform for design, testing, and troubleshooting

Cisco Learning Network

Resource community portal for certifications and learning



Train



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Cisco Instructor-led and Virtual Instructor-led training

Accelerated curriculum of product, technology, and certification courses



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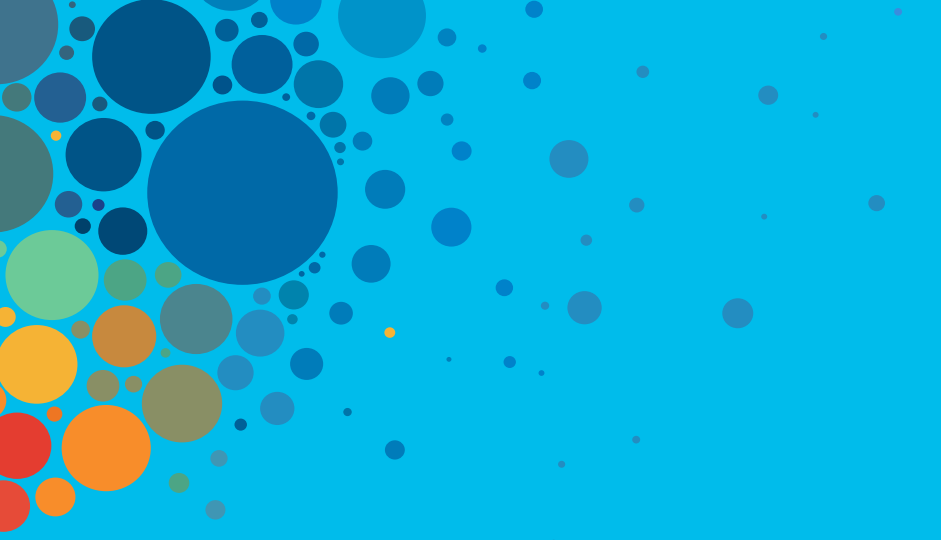
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- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand



The bridge to possible

Thank you

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