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APAC, India and Japan
Technology and Solutions Summit 2019
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HPE SimpliVity for End User Computing

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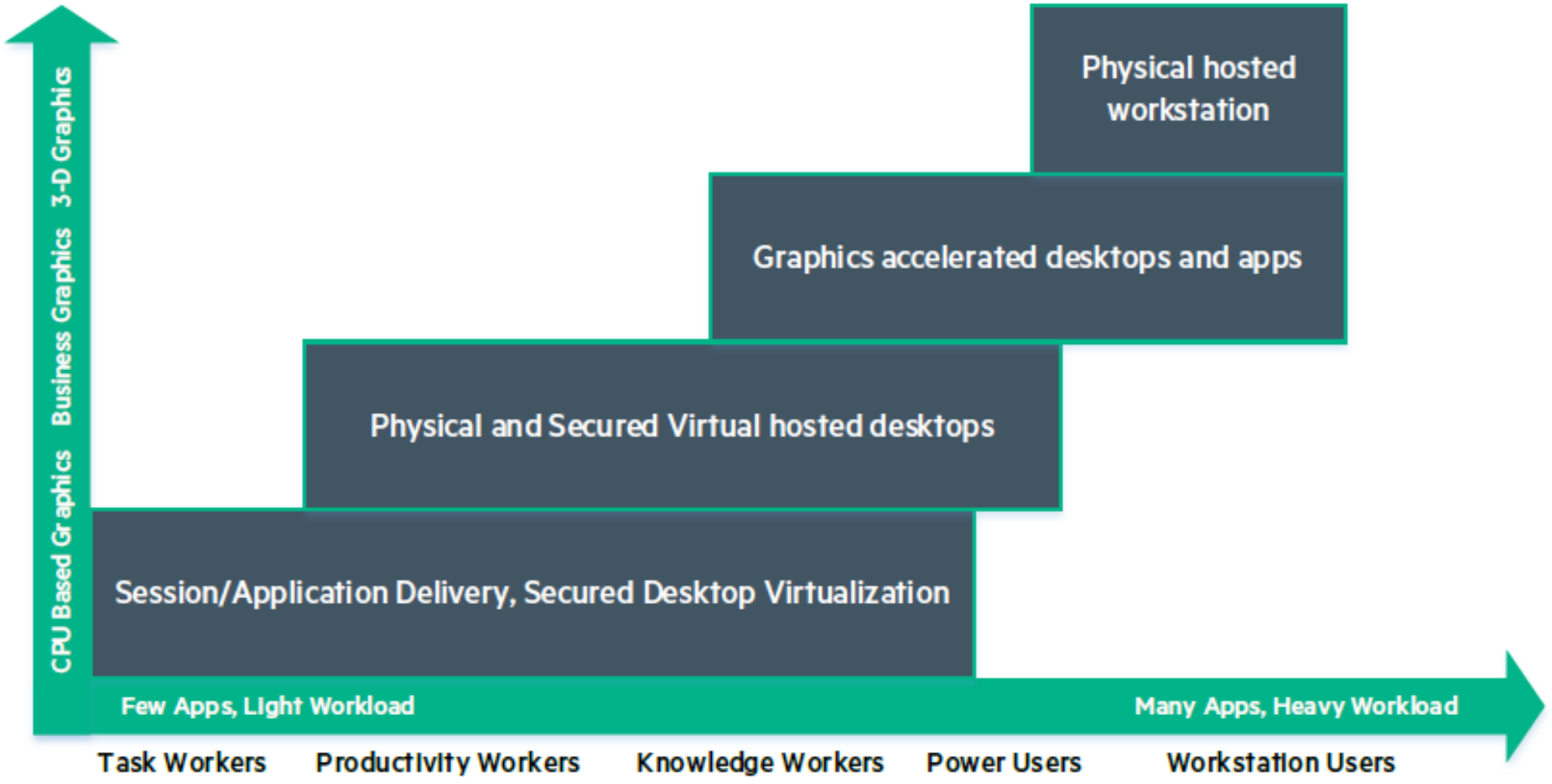
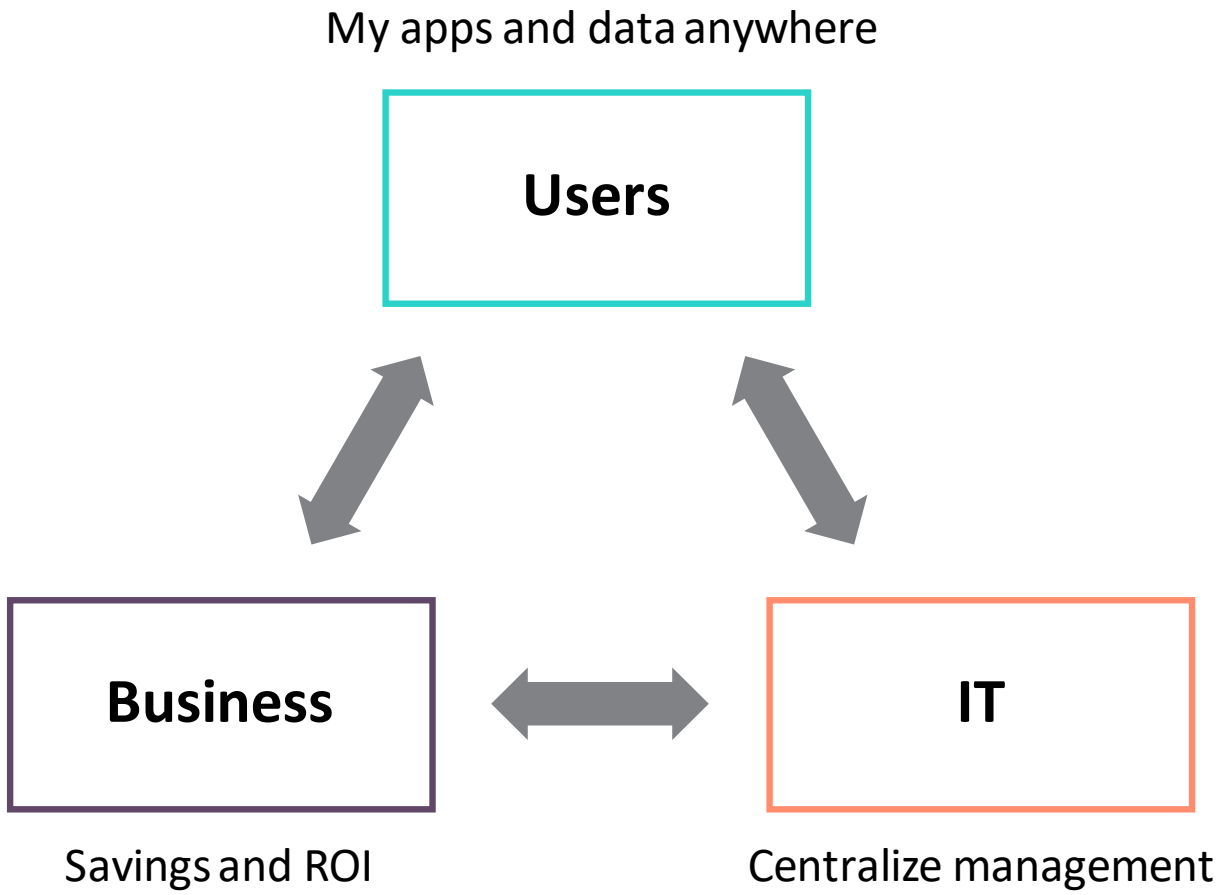
March 2019

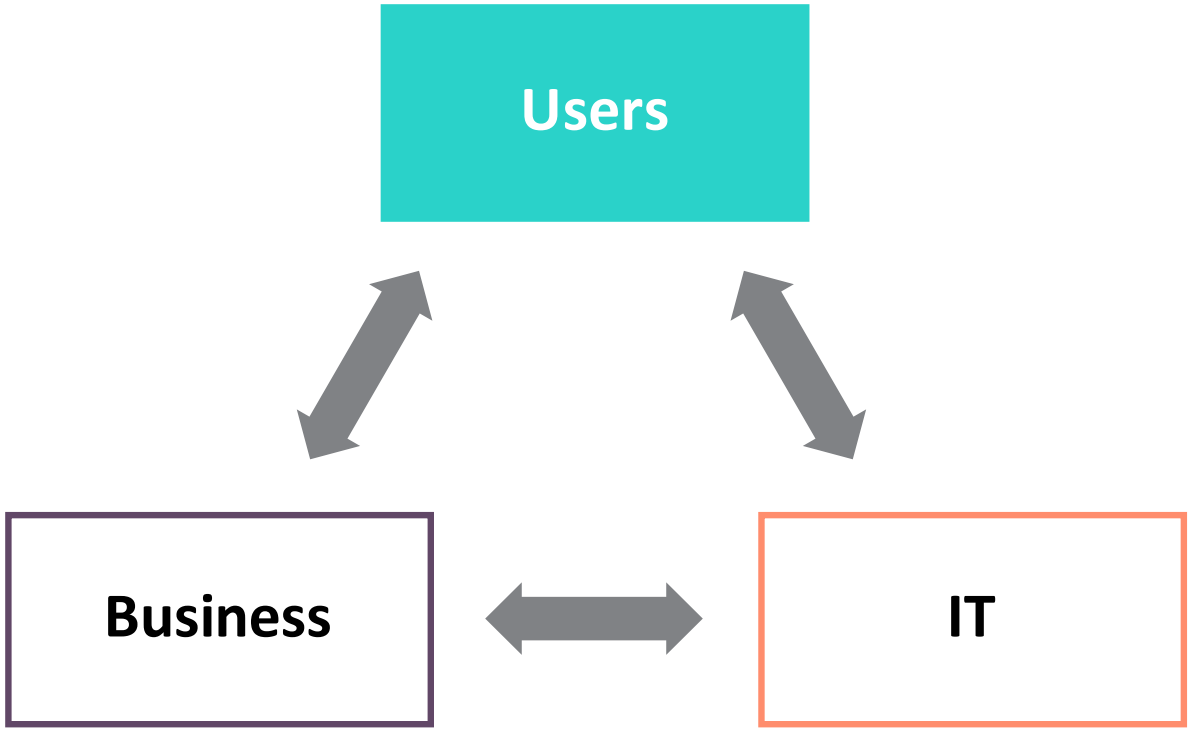
Client Virtualization Technology Landscape



Why client virtualization?



The central challenge of client virtualization



User expectations

1. Reliable, always-on experience
2. Fast, responsive applications
3. My data and apps anywhere

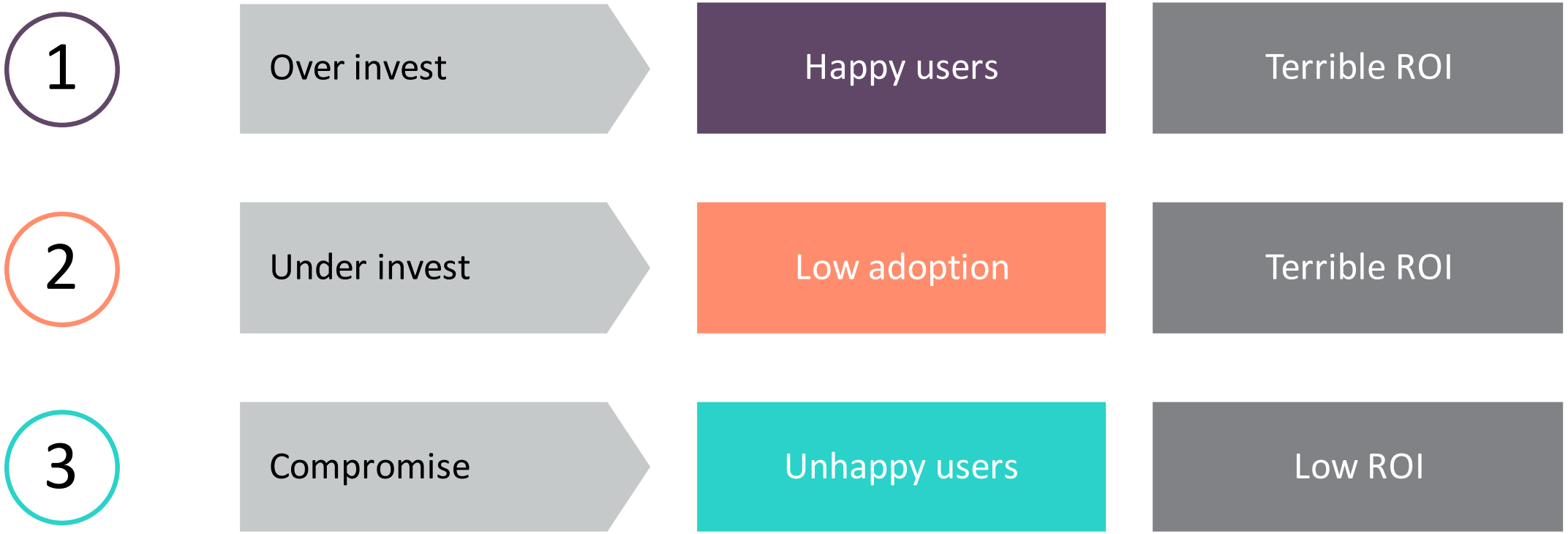
Business imperatives

1. Enable and retain users
2. Minimum total cost
3. Speedy return on investment

IT realities

1. Expensive, siloed infrastructure
2. Demand spikes and login storms
3. Difficulty scaling
4. Risk of data loss/downtime

Possible client virtualization outcomes



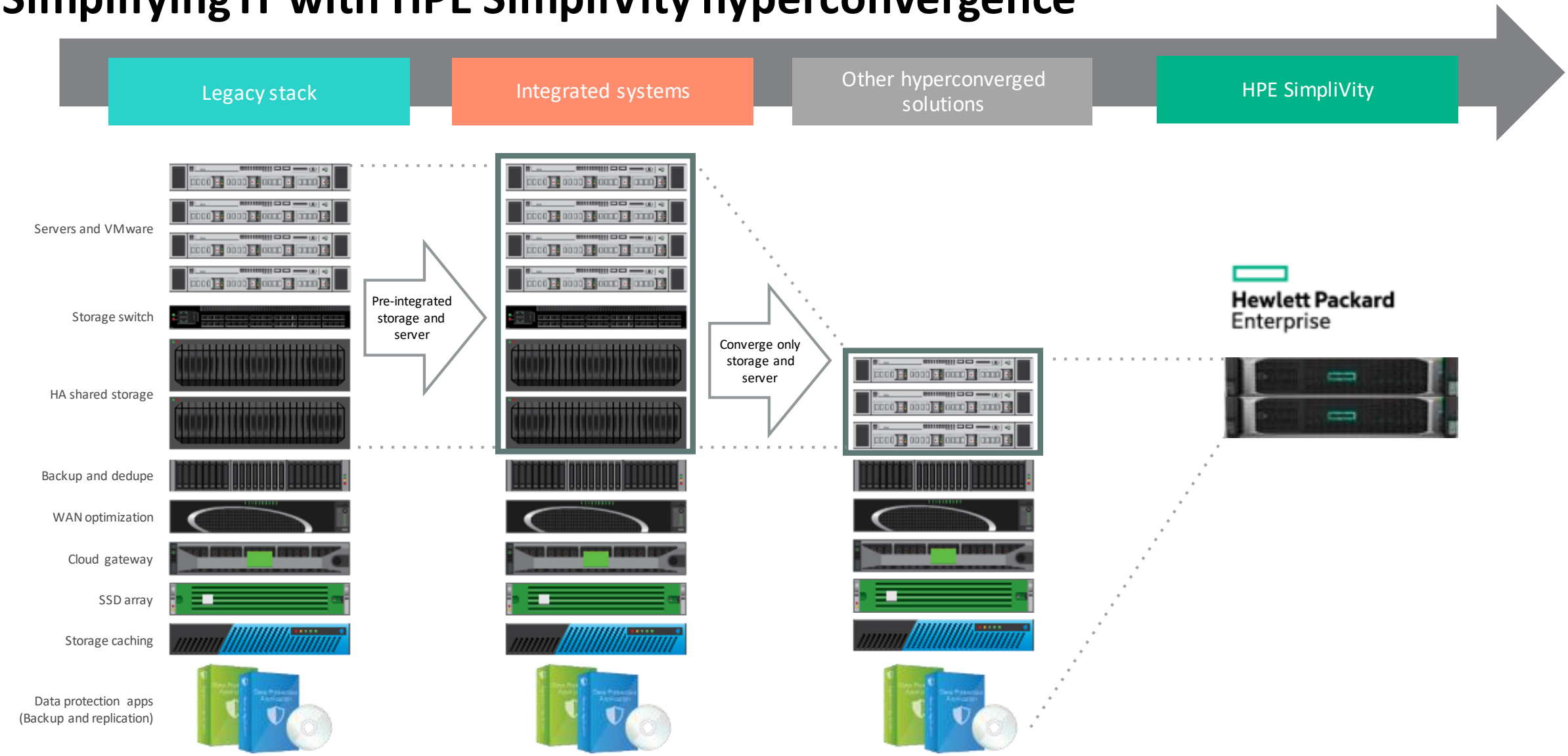
A better approach

Strategies to delivering client virtualization without compromise

1. Simplify infrastructure-supporting client workloads
2. Start small and scale out versus sizing upfront
3. Address performance intelligently, without breaking the bank
4. Build-in resiliency – treat client workloads like first-class citizens

HPE SimpliVity at a glance

Simplifying IT with HPE SimpliVity hyperconvergence



The HPE SimpliVity Data Virtualization Platform

Global VM-Centric Management and Mobility

- Policy-based, VM-centric management
- No LUNS, shares, or volumes
- Right-click operations
- Native tool integration
- Single view of all data centers and ROBOs

Built-in resiliency, backup, and disaster recovery

- Full logical backups with near zero overhead
- Guaranteed 60-second restore of 1TB VM
- Granular RTOs and RPOs from hours to seconds
- Simple, affordable offsite DR
- RAIN + RAID protection of data

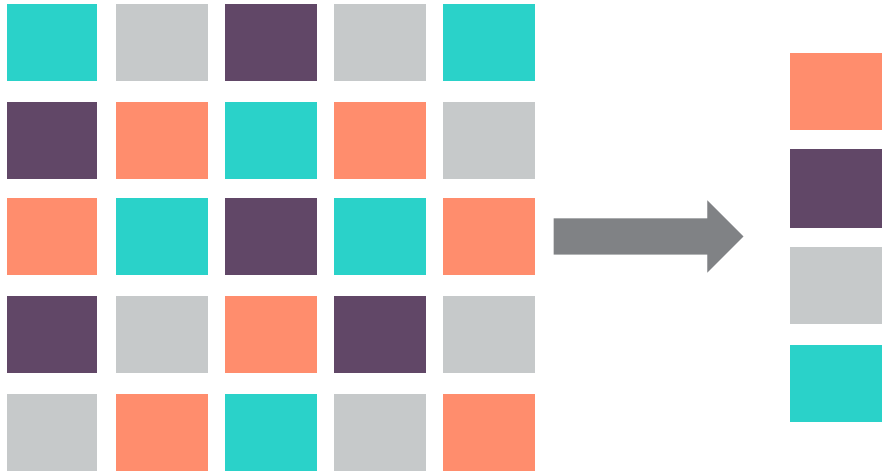
Guaranteed Data Efficiency

- Always-on compression and deduplication
- All data at inception, globally
- Offloaded to OmniStack Accelerator
- Guaranteed 90% capacity savings across primary storage and backup

Accelerated performance and data efficiency

"The best I/O is the one you don't have to do." —Gene Amdahl

In-line deduplication



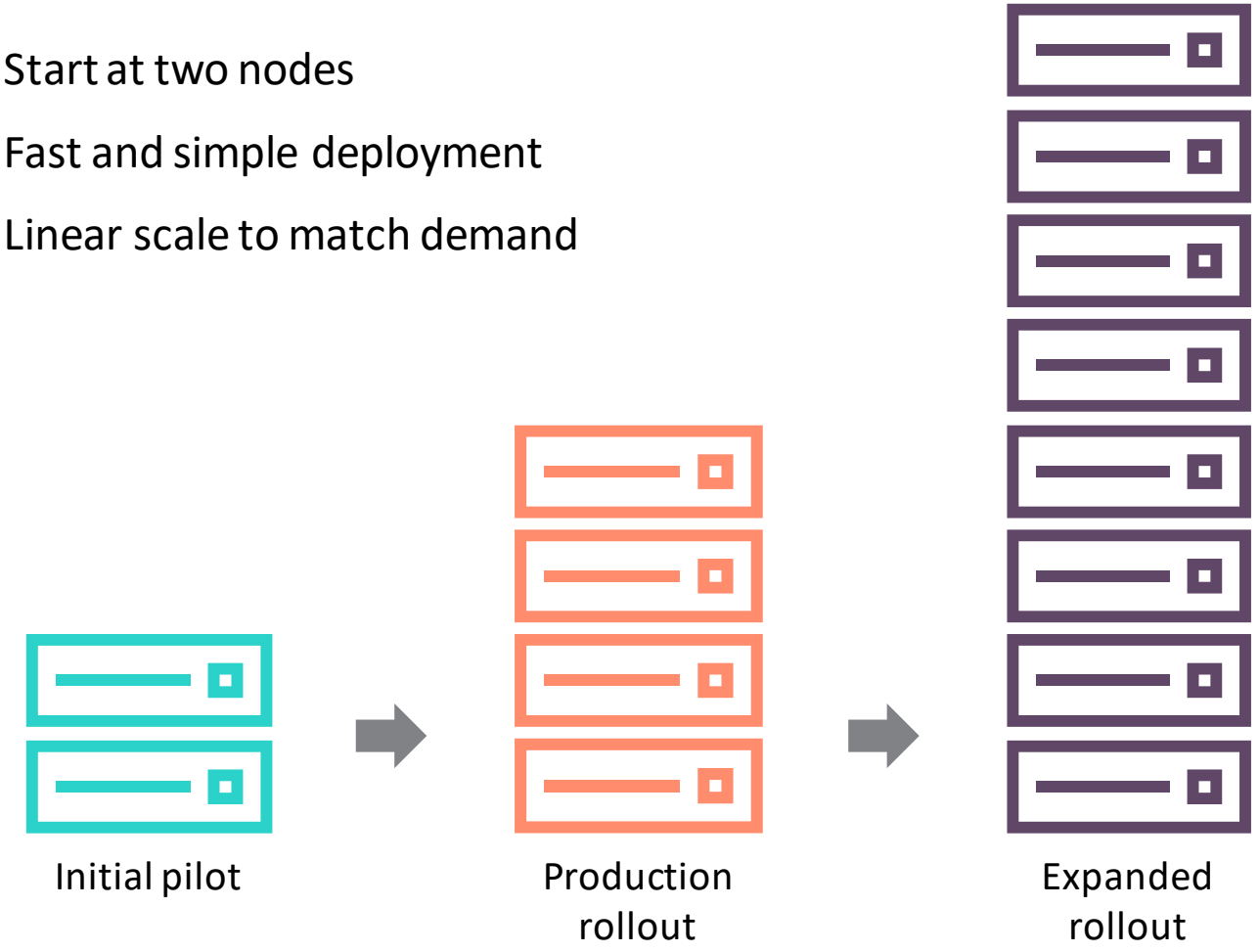
- Increased performance by eliminating IOPS
- Average efficiency of 40:1
- Full clones stored as efficiently as linked clones

Start small and scale out – from pilot to production

– Start at two nodes

– Fast and simple deployment

– Linear scale to match demand

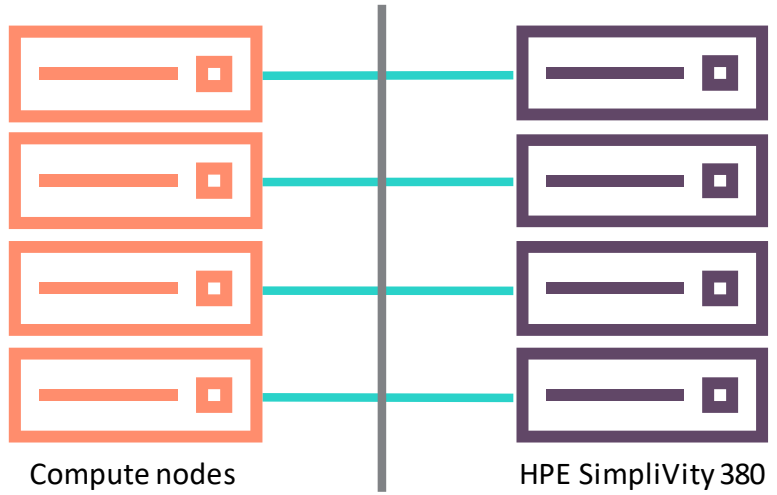


Independently scale compute and memory

– Additional compute power when needed

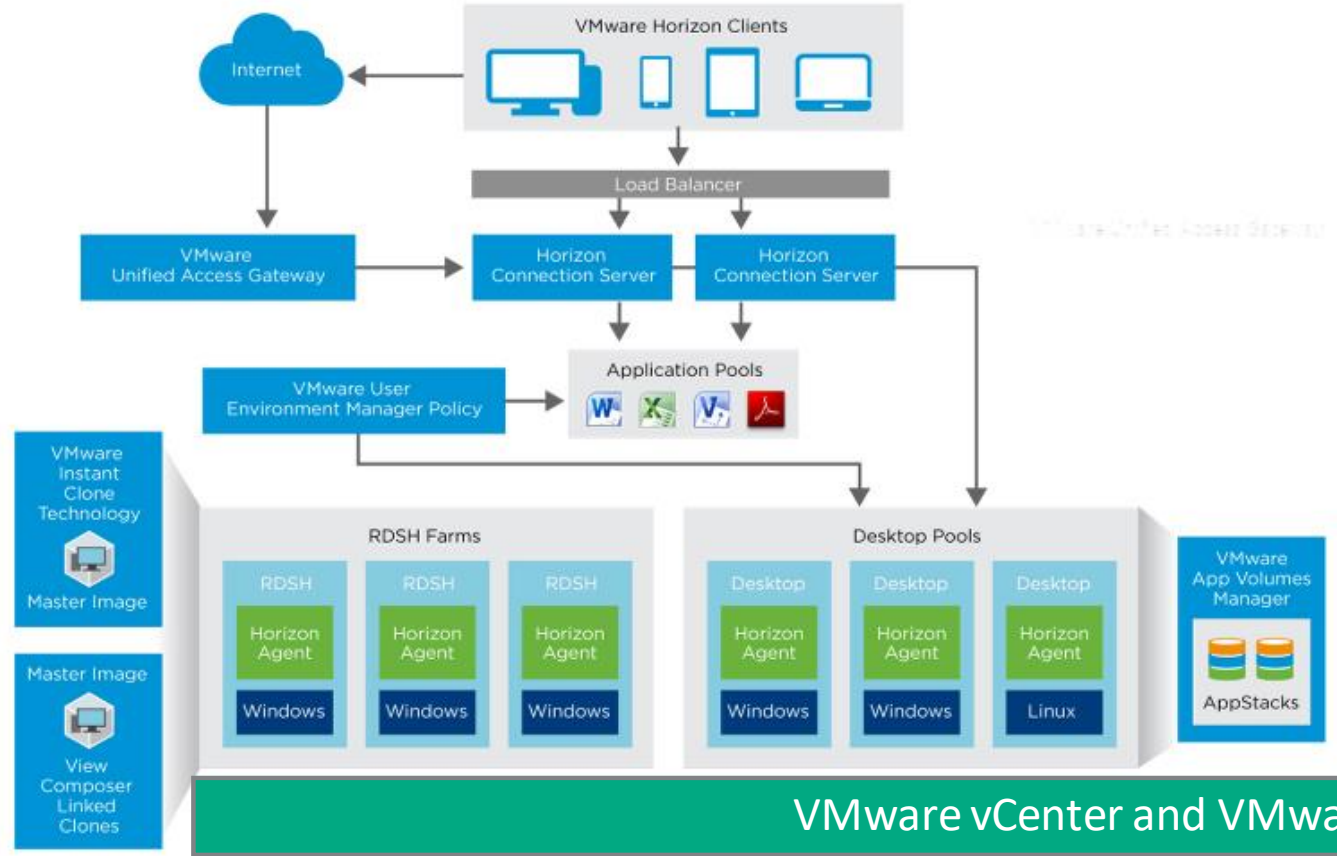
– Supports GPUs for graphics users

– Leverage new or existing hardware



EUC Offerings on HPE SimpliVity

VMware Horizon View 7 Offering



1. Simplified deployment with hyperconverged building blocks.
2. Ability to start small and scale out in affordable increments—from pilot to production.
3. Support for instant clones (new) and App volumes
4. Efficient and cost-effective BC/DR strategies
5. Validated by LoginVSI

VMware vCenter and VMware vSphere

HPE SimpliVity 380 Gen10 (+ NVIDIA GPU)

OR

HPE SimpliVity 2600 Gen10 (+ NVIDIA GPU)

vmware

VALIDATED BY LOGINVSI

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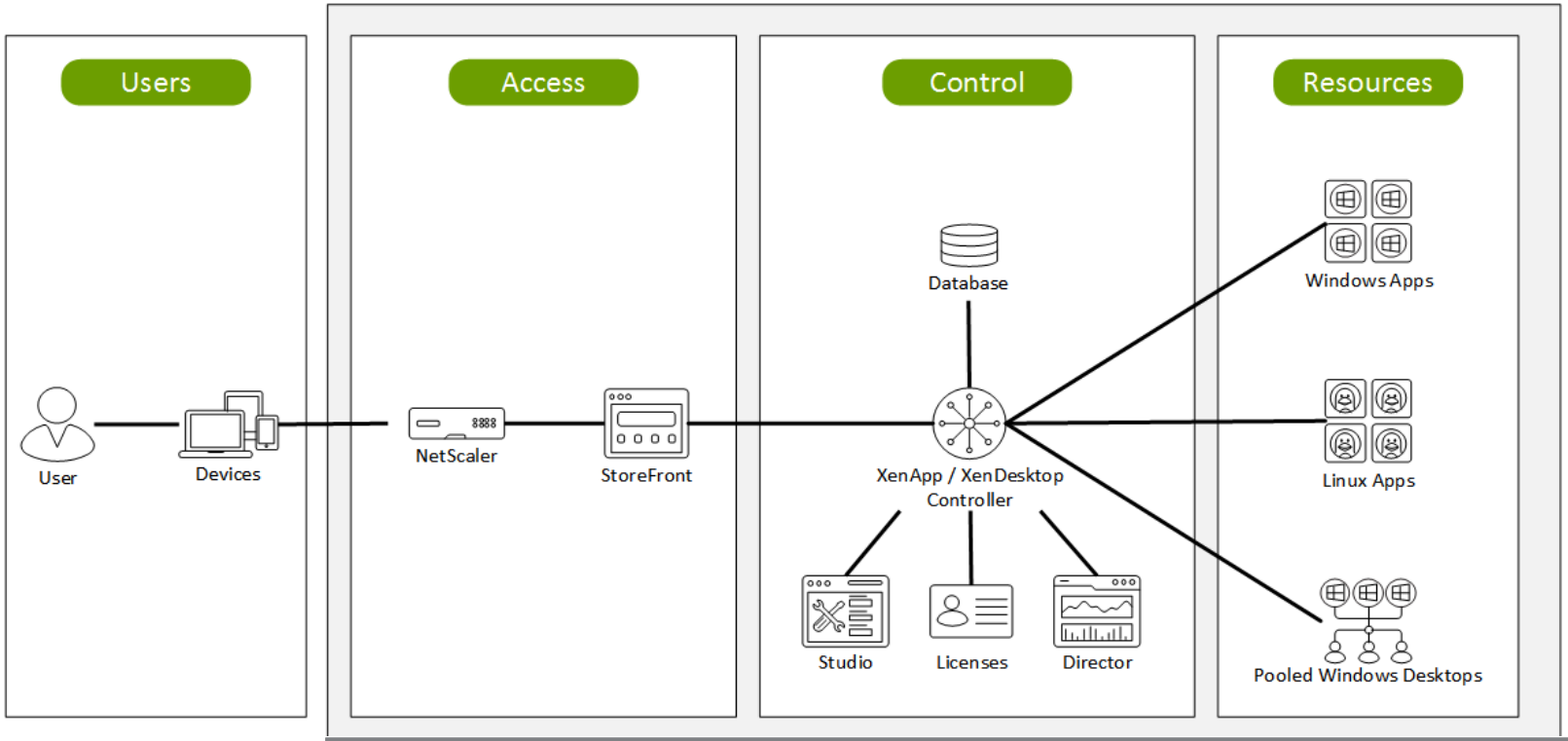
Citrix XenDesktop/XenApp



1. Jointly built solutions and strong alliance relationship
2. Scales to meet the needs of changing workloads, on your timetable.
3. Support for both MCS and PVS provisioning methodologies
4. Efficient and cost-effective BC/DR strategies
5. Validated by LoginVSI

CITRIX

VALIDATED BY LOGINVSI

VMware vCenter and VMware vSphere

HPE SimpliVity 380 Gen10 (+ NVIDIA GPU)

OR

HPE SimpliVity 2600 Gen10 (+ NVIDIA GPU)

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HPE SimpliVity for client virtualization

An excellent user experience, without compromise

Unmatched and independently validated client virtualization performance for a superior user experience

- Excellent desktop performance with or without hardware acceleration
- Thorough validation by Login VSI for both Citrix and VMware based solutions

More desktops on less hardware to reduce capital expenditure (CAPEX) and operational expenditure (OPEX)

- Highest desktop density at 250 desktops per node, without compromising performance or high availability
- Deploy full-clone desktop with the same efficiency and savings of linked clones

Linear scaling in affordable increments—from pilot to production

- Start small and scale up in affordable increments, starting at only two nodes
- Leverage your existing infrastructure to scale via compute nodes

Enterprise-class protection and resiliency

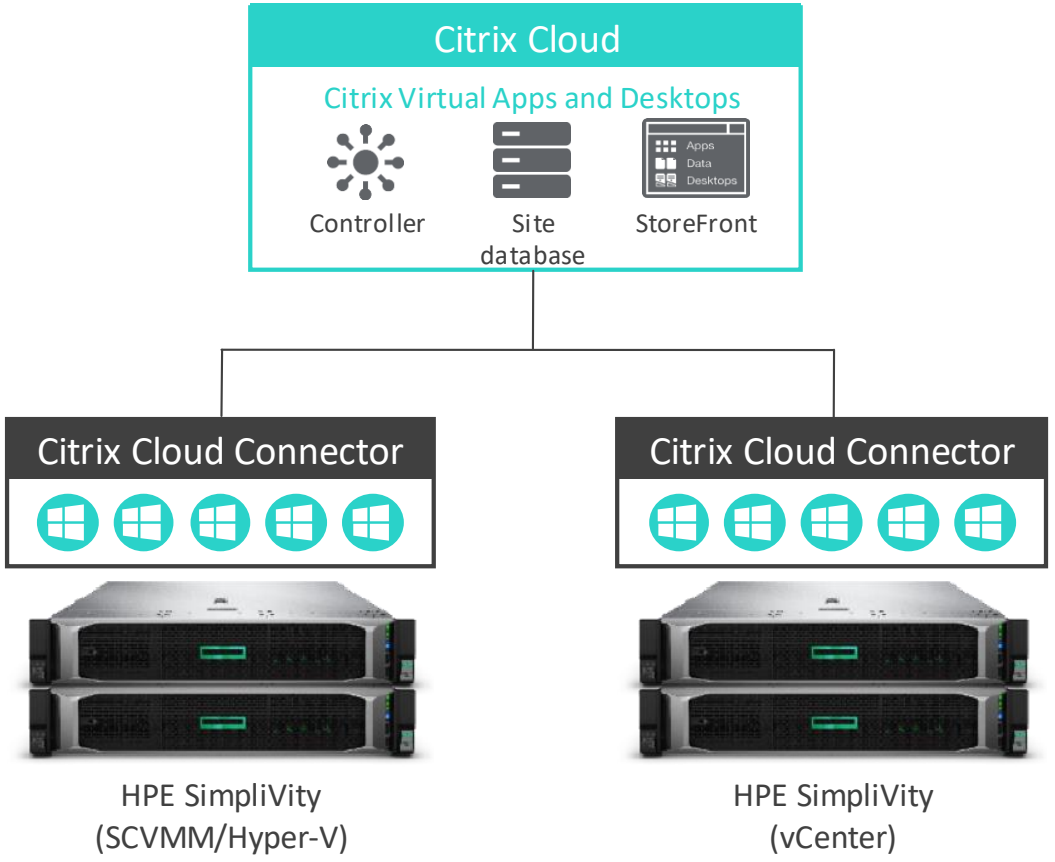
- Built-in data protection for all client virtualization workloads
- No single points of failure—resiliency to withstand component failure without VM downtime and node failure with no loss of data

Offering 2b - HPE SimpliVity for Citrix Cloud (CWA)

Hybrid deployment of Citrix XenDesktop/XenApp solution

1. Citrix Cloud XenApp and XenDesktop Service
    1. Simplify Management
    2. Improve Security
    3. Faster provisioning

2. HPE SimpliVity Software integration for Citrix Cloud that provides:
    1. Software integration for HPE SimpliVity HCI that automates the deployment of Cloud Connector VMs
    2. Automate HPE SimpliVity connection to Citrix cloud and registration as a XenDesktop/XenApp resource
    3. Leverages SimpliVity and Citrix Cloud APIs to automate deployment
    4. Executed directly through SCVMM (Hyper-V) and vSphere Web Client (VMware) – Management interfaces for SimpliVity HCI



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Support and Availability

- Hypervisor support
  - Hyper-V 2016/SCVMM 2016
  - vSphere 6.5 – Flex
    - Support for HTML5 will be added after the SimpliVity UI supports all operations
- Platform support
  - HPE SimpliVity 380
  - HPE SimpliVity 2600
- Download
  - Both plug-ins are available for download from:
    - https://github.com/HewlettPackard/SimpliVity-Citrix-HyperV-Plugin
    - https://github.com/HewlettPackard/SimpliVity-Citrix-VCenter-Plugin
- Maintenance
    - Bugs and enhancement requests tracked via HPE GitHub
    - Plugins maintained directly on GitHub with periodic updates/patches
    - Supports newer versions of SCVMM, vCenter, and Citrix as supported by the platform

CWA –Solution Value

Additional value on top of existing HPE SimpliVity client virtualization value

1. **Simplified Deployment and Management**
   1. Turnkey solution that let's you deploy and start consuming XenDesktop and XenApp SaaS within minutes across multiple SimpliVity clusters/sites.

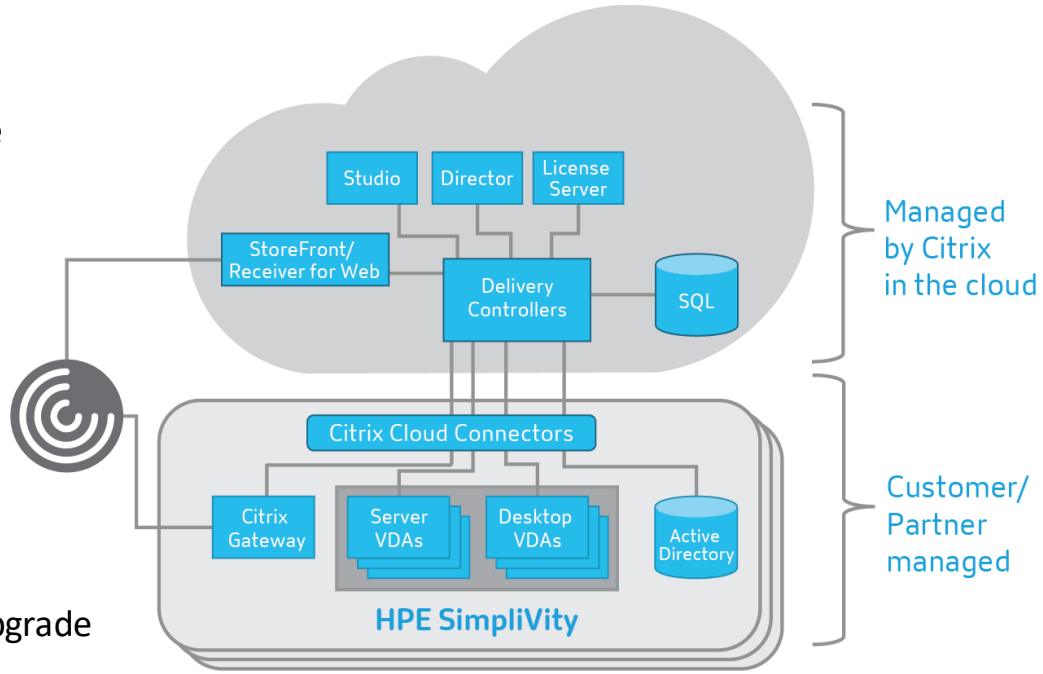
2. **Hypervisor agnostic**
   1. Plugins available for SCVMM and vCenter to provide similar user experience regardless of underlying hypervisor used.

3. **Security**
   1. Built on the most secure HPE servers. Customers control data on-prem
   2. Security best practices managed by Citrix Cloud.

4. **Validate under Citrix Ready program**
   1. Solution validated and supported under Citrix Ready program.

5. **Simplified Lifecycle Management**
   1. SimpliVity upgrade manager provides new functionality to independently upgrade components
   2. Citrix Management infrastructure maintained/upgraded/patched by Citrix Cloud.

6. **Scalable & BCDR** –
   1. Scale environment linearly with a building block approach with SimpliVity HCI
   2. HA of Citrix Components managed by Citrix. Simply point to another SimpliVity cluster in the federation



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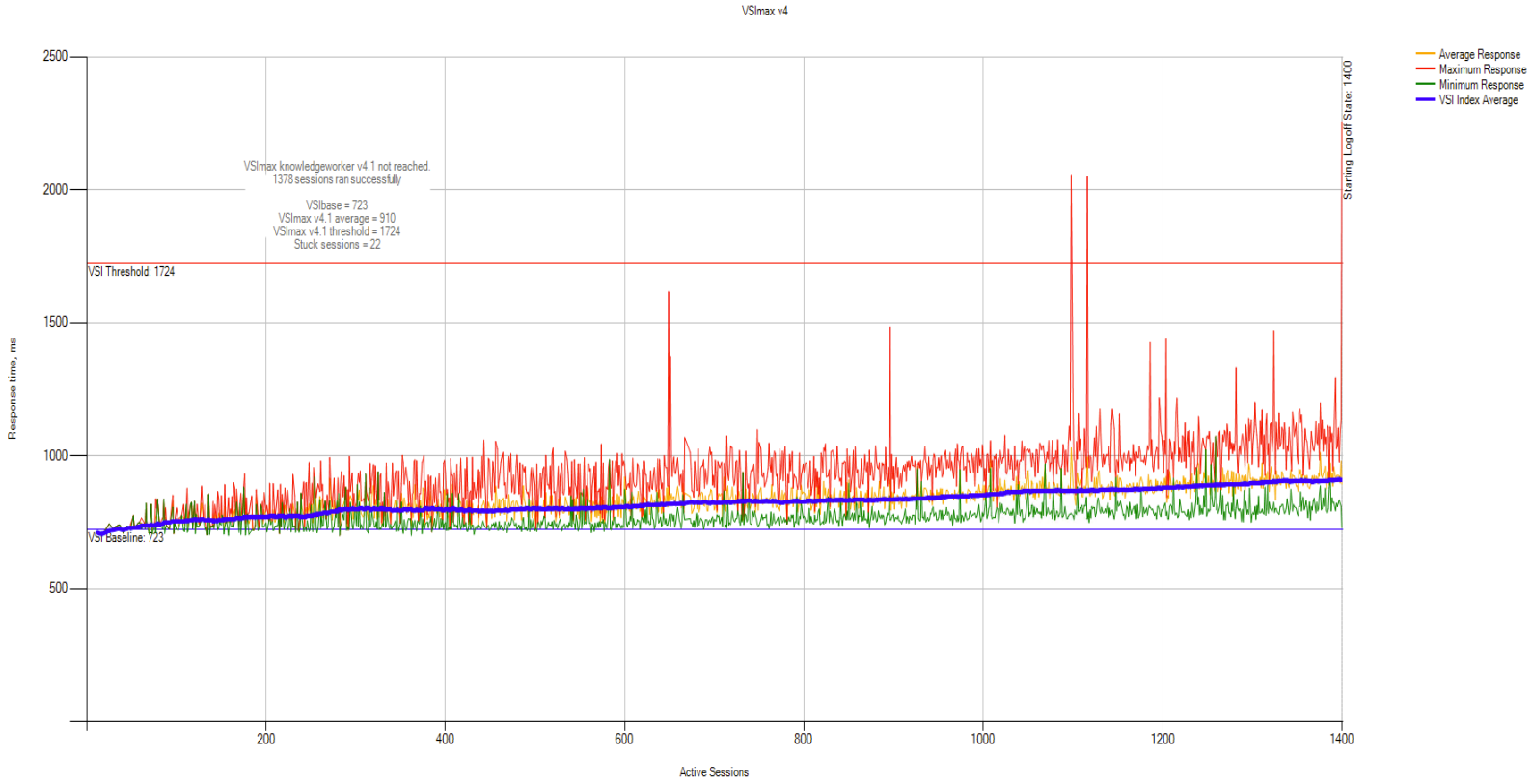
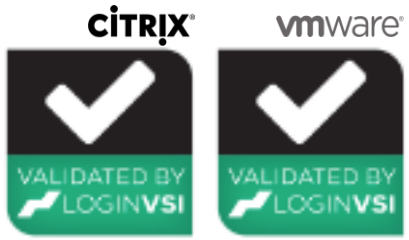
Validated by Login VSI

– Login VSI is the industry standard for client virtualization performance testing.

– The validation involves in-depth auditing of performance results.

– HPE SimpliVity solutions have completed validation more than any other vendor.





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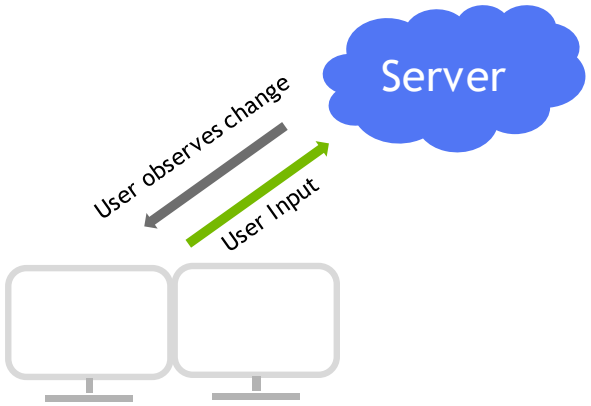
CIRRUS – BENCHMARKING VDI

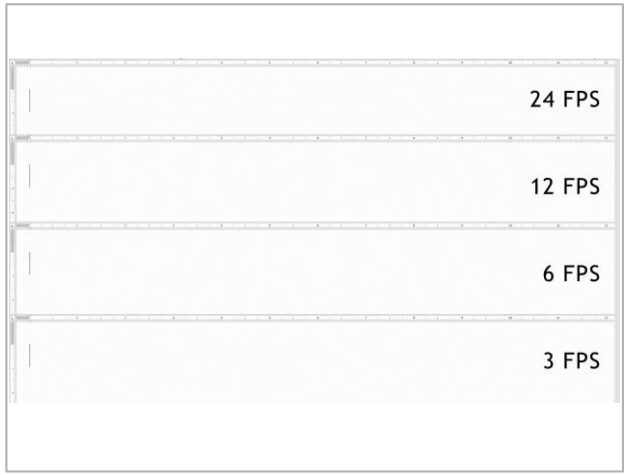
First VDI Benchmark measuring User Experience

End User Latency



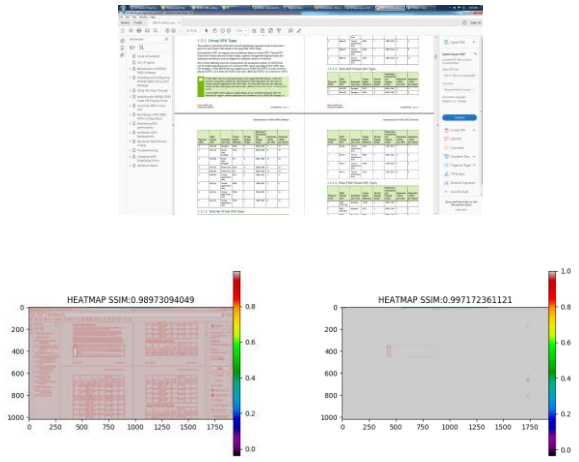
Measures the end user responsiveness

Framerate



Measures the fluidity of your session

Image Quality



Measures the impact of the remote protocol

HPE SimpliVity testing with Cirrus now to provide better guidance around GPU performance

HPE SimpliVity Platform Offerings

Enables Multi-Cloud via Multiple Hypervisor Support

HPE SimpliVity 380 combines the industry's most complete hyperconverged solution with the best-selling server platform on the market. Designed and optimized for modern virtual environments, HPE SimpliVity delivers all IT infrastructure and advanced da ta services for virtualized workloads —including compute, storage, built-in data protection, WAN optimization and disaster recovery—in a single, scalable 2U atomic building block.

Multiple Hypervisor Support

vmware vSphere

Microsoft Hyper-V

Key business outcomes include:

- Achieve faster time to market and response times
- Simplify procurement and support of IT resources
- Redirect dedicated FTE's to other initiatives
- Reduce spend on IT infrastructure and licensing
- Reduce data center real estate space
- Improve availability & Achieve greater efficiency

HPE SimpliVity 380 Gen10

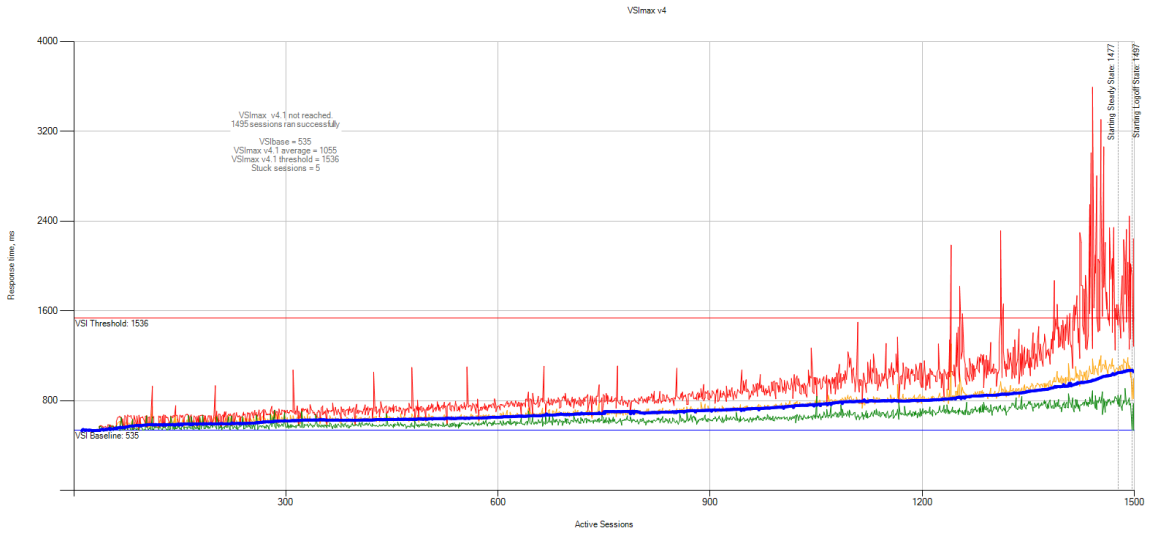
Higher flexibility with higher per node density

Hardware accelerated powerhouse

- Peak and predictable VDI performance, tested by HPE and Login VSI
- Multiple storage capacity points
- Maximum expandability for NIC and GPU options
- Higher CPU and memory capabilities
- VMware and Citrix client virtualization options

HPE SimpliVity 380 Gen10 Login VSI Results

- Tested 1500 Desktops in 16 Rack Units
- 187.5 Knowledge Worker desktops per node
- VSIbase of 535ms, VSImax Average of 1055ms
- VSImax was not reached



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HPE SimpliVity 2600 Gen10

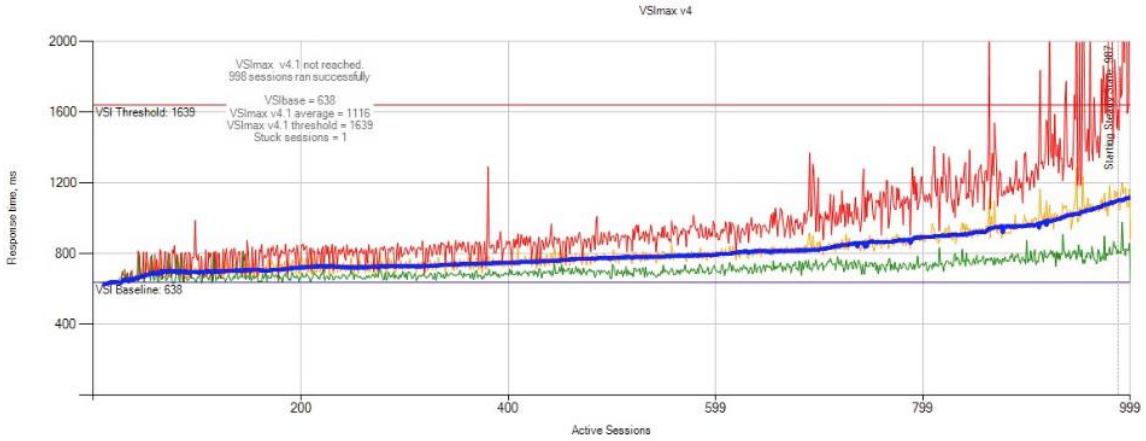
More virtual desktops in limited data center space

Software-optimized with full feature set

- Optimized for space constrained deployments; Need for dense compute with moderate storage
  - 2 or 4 nodes per 2U chassis
  - 2X to 3X more dense compared to HPE SimpliVity 380 Gen10
- Peak and predictable VDI performance, tested by HPE and Login VSI
- First vendor to deliver consistent performance with always-on dedupe and compression enabled by software
- Same HPE SimpliVity benefits

HPE SimpliVity 2600 Gen10 Login VSI Results

- Tested 1000 Desktops in 6 Rack Units
- ~170 Knowledge Worker desktops per node
- VSIbase of 638ms, VSImax Average of 1116ms
- VSImax was not reached



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HPE SimpliVity portfolio – intra-line positioning

HPE SimpliVity 2600	HPE SimpliVity 380
• Compute-intensive workloads • Dense form factor for space-constrained environments • Highest GPU per RU density (2)	• Storage-intensive workloads • Multiple storage capacity points • Maximum expandability for NIC/HBA/GPU options

HPE SimpliVity core values across the portfolio		
VM-centric management/mobility	Built-in data protection	Always-on, inline dedup/compression
Peak and predictable performance	Linear scaling	Customer choice

HPE SimpliVity portfolio – VDI use case and verticals

HPE SimpliVity 2600 for VDI	HPE SimpliVity 380 for VDI

• VDI customers who need a dense solution due to either physical or financial constraints
  • Oil & Gas – Extreme space constraints on offshore platforms and remote drilling sites
  • Retail (POS) – Chain stores and franchises who want to manage POS centrally, but want equipment onsite
  • SLED – Need many desktops for computer labs. Very little space available for infrastructure
  • Colocations – High cost of rack space in urban DCs places a premium on dense infrastructure
	• VDI customers who have heavy storage/compute workloads or persistent desktops that maintain large amounts of user data to minimize network costs
	  • Architecture/engineering – blueprints are downloaded and kept on local VDI VMs at the construction site
	  • Automotive – CAD files maintained at factory equipment for duration of manufacturing
	  • Remote VDI – maintain user data locally because of latency and availability of working from remote sites
	  • Research (genomics, fluid dynamics) – very large files needed for low latency processing over the duration of a research project
	  • IT – multiple applications needed on a daily basis

GPU Options

NVIDIA TESLA GPUs

Supported on HPE SimpliVity 380 and 2600 Platform

	Tesla P40	Tesla M10	T4 (Coming Soon)
Use Case	QuadrovDWS (Mid to High)	User-Density Optimized	Entry to Midrange Quadro Workstations
Number of GPUs	1 NVIDIA Pascal GP102	4 NVIDIA Maxwell GPUs	1 Turning GPU
Total NVIDIA CUDA Cores	3,840	2,560 (640 per GPU)	2560
Total Memory Size	24GB GDDR5	32GB GDDR5 (8GB GPU)	16 GB GDDR6
Max Power	250W	225W	70W
Form Factor	PCIe 3.0 Dual Slot	PCIe 3.0 Dual Slot	PCIe 3.0 Single Slot (rack servers)
Cooling Solution	Passive	Passive	Passive

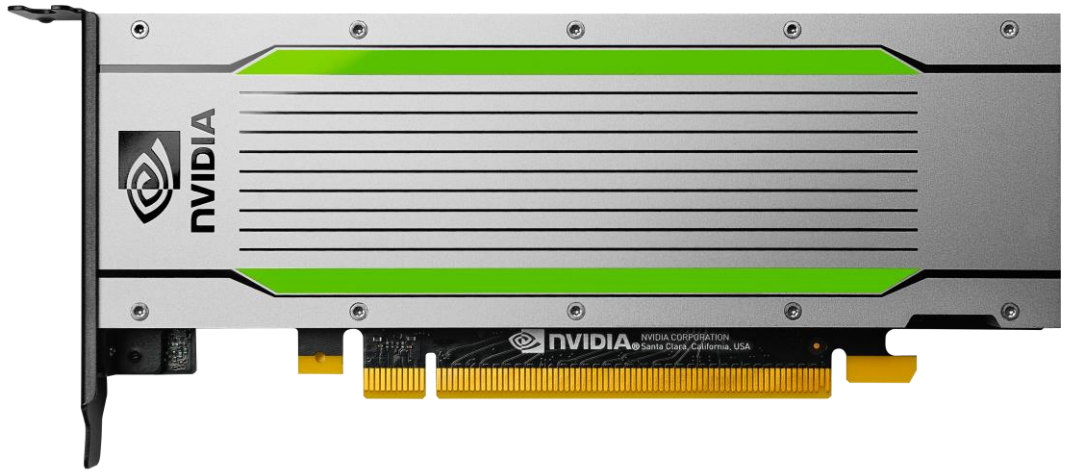
NVIDIA T4 FOR VIRTUALIZATION

Powerful, Versatile Platform for VDI

Powerful **virtual workstation** for the engineer, professional designer, and data scientist

Deep learning inferencing for virtual labs and classrooms

High density **virtual desktops** for the best user experience for Windows 10



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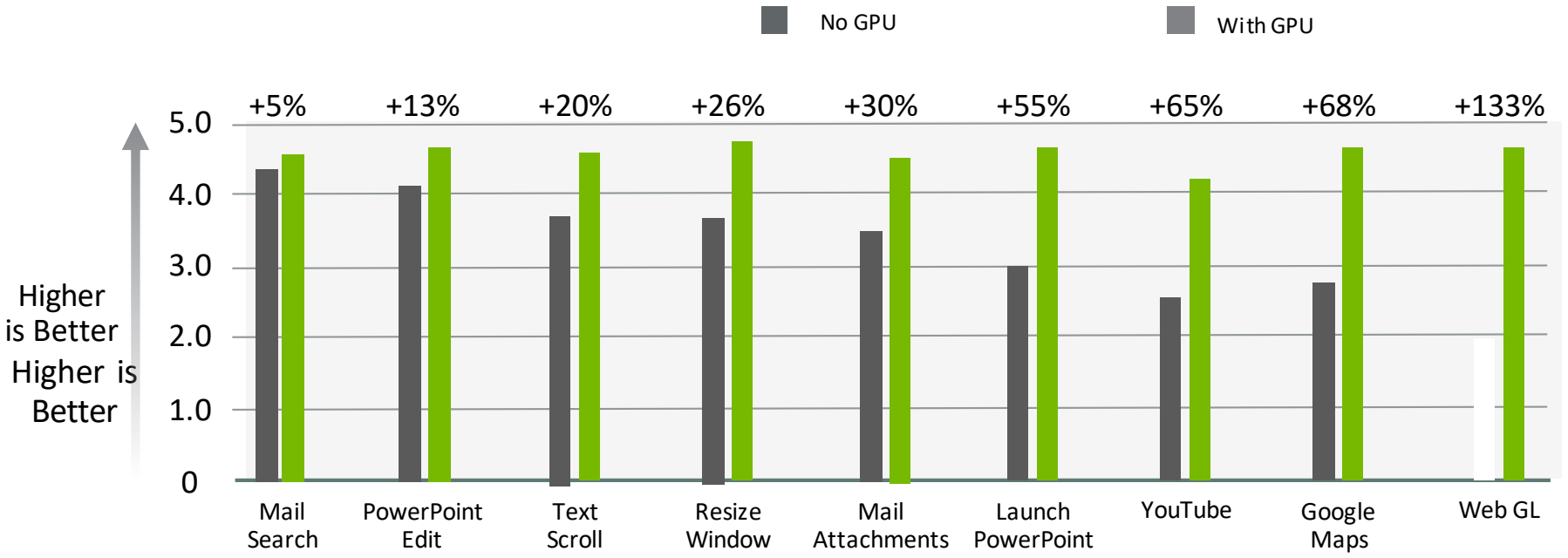
WINDOWS 10 WITH CPU vs. NVIDIA GRID

NVIDIA GRID provided an average 34% increase in Win10 UX quality



User Experience Scale

Outstanding - as good (or almost) as physical

Pretty good for a virtual desktop

Tolerable, I guess I can make do

Barely useable, borderline, but I'll get tired of this soon

Unacceptable, unusable—fire someone in IT

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Testing ran on two identical systems, CPU system was loaded up to 60-80% utilization, the GPU system ran the same workload

NVIDIA T4 FOR VIRTUAL PCs

Optimize Data Center Utilization with Mixed Workloads

T4 vs. CPU only: Adding NVIDIA GPUs results in 1.4X better user experience versus CPU only VMs**

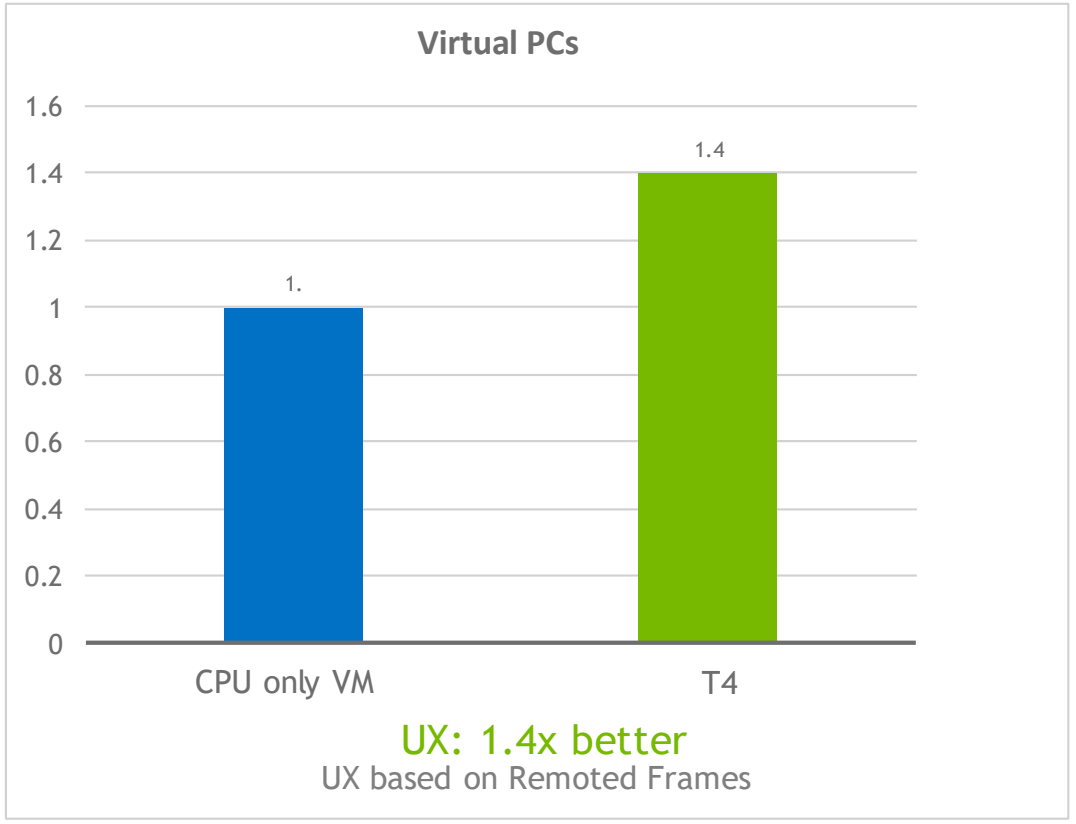
T4 vs. M10: provides same user density with lower power consumption*

Same user experience & performance**

Support for VP9 decode

Support for H.265 (HEVC) 4:4:4 encode and decode

Support for >1TB system memory



- Two NVIDIA T4 GPUs support the same user density as a single M10 and fit in the same 2 slot PCIe form factor.

** NVIDIA internal benchmark running Microsoft PowerPoint, Word, Excel, Chrome, PDF viewing and video playback.

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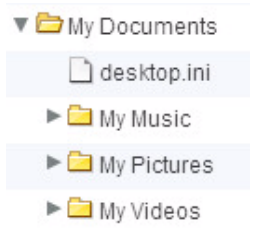
GPU Performance

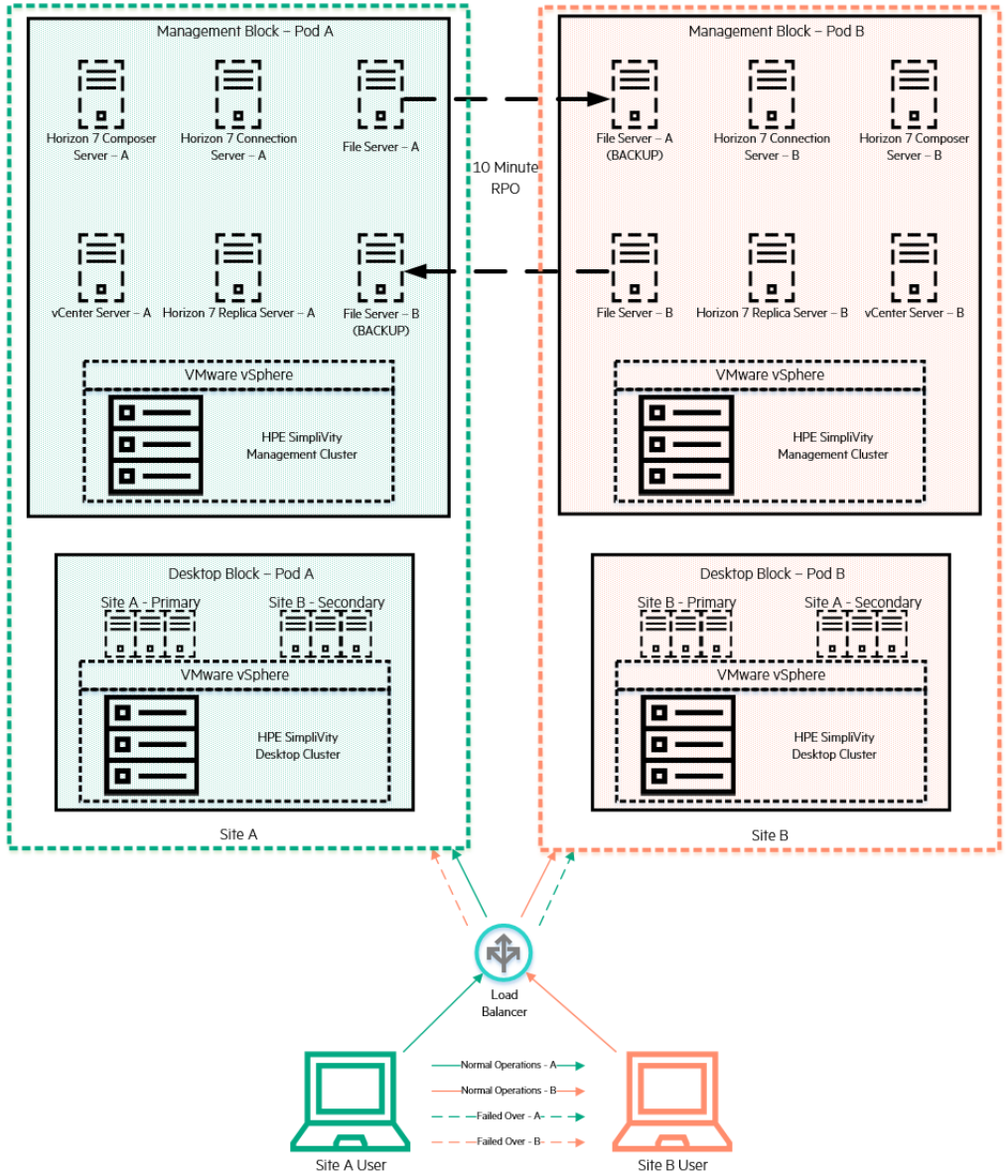
BC/DR

Resiliency on HPE SimpliVity

File	VM	Node	Cluster	Federation
				
– File level restore – Multiple points in time – Restore to any VM	– New or replacement VM – Multiple points in time – Fully independent	– Hardware RAID – Component-level redundancy and protection – Integrity checks and bit rot detection	– Per VM RAIN – High availability	– Site-to-site DR – Remote backup and recovery – Unique block replication

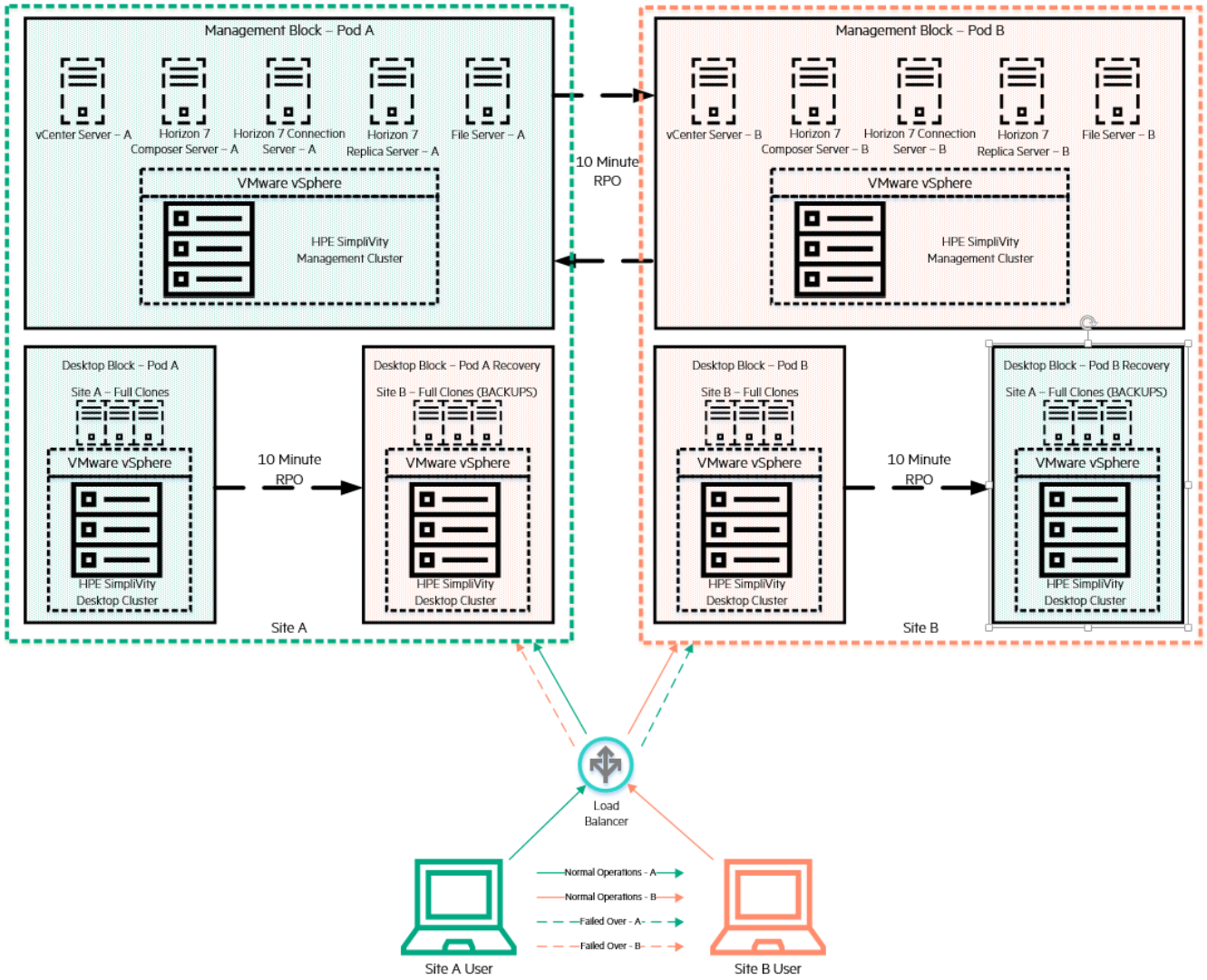
Disaster Recovery for VDI – Non-persistent desktops

- Full reporting of scenario and design is available in [HPE Reference Architecture for VMware Horizon 7 on HPE SimpliVity 380 Gen10]
- State of individual desktops does not matter, so they are not failed over
- File server (or other profile/user data store) is failed over from one site to another
- Staged desktop VMs in Site B are ready to accept connections from Site A users
- Global Site Load Balancer (GSLB) strongly recommended to minimize RTO

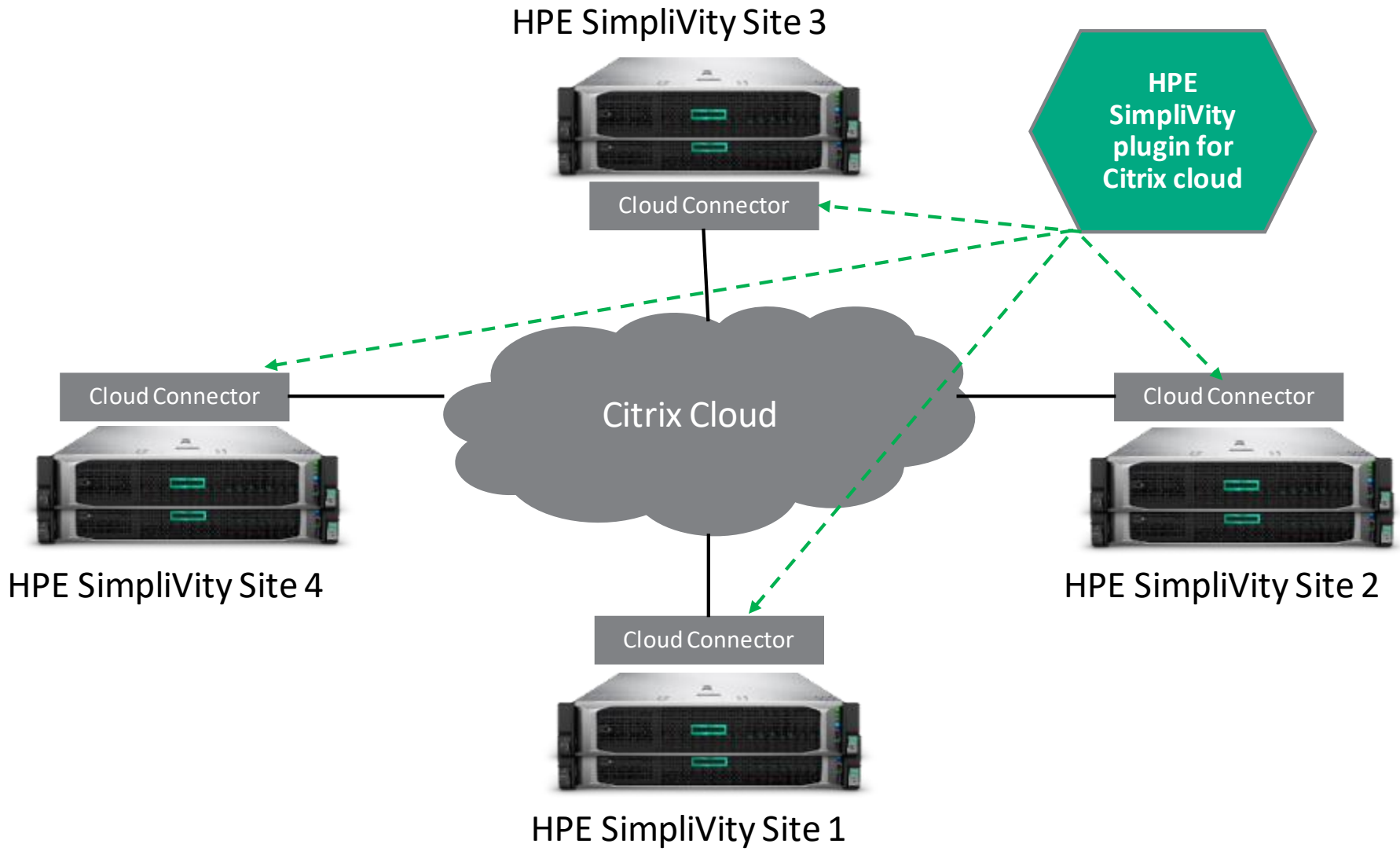


Disaster Recovery for VDI – Persistent desktops

- Full reporting of scenario and design is available in [HPE Reference Architecture for VMware Horizon 7 on HPE SimpliVity 380 Gen10]
- State of individual desktops matters, so they are failed over
- All management workloads must be failed over to ensure desktops stay within same management domain for VMware Horizon/Citrix XenDesktop **and** vSphere
- Each pod has opposite physical site failover desktop infrastructure within its management domain (see image for clarity)
- Backup/restore to fail over, look to RapidDR to lower RTO
- Global Site Load Balancer (GSLB) strongly recommended to minimize RTO



HPE SimpliVity 380 for Citrix Cloud Services



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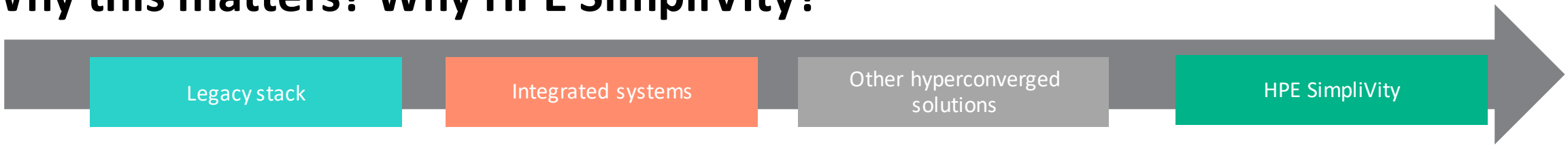
Conclusion

Why this matters? Why HPE SimpliVity?



1. HCI is one of the fastest growing segments in IT market.
2. Hyper-converged infrastructure combines simplified IT with performance to run virtual apps or desktops on-premises
3. Delivers the performance, protection, privacy, and control needed for business-critical workloads, unlike inefficient point products and siloed IT architectures.
4. Drives time to value with massive reduction in complexity
5. The HPE SimpliVity solution features a scale-out architecture that minimizes upfront investments and provides a high degree of flexibility and extensibility.
6. Built-in data protection further improves TCO.
7. All offerings are validated by Login VSI
8. Best-in-class desktop density with leading EUC technologies like Horizon View and Citrix XenDesktop/XenApp
9. High-end graphics virtualization is supported by NVIDIA® GPUs.
10. Built on the world's best-selling HPE server platform
11. Leverage existing servers to increase only the compute resources in the SimpliVity cluster.

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Thank you

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