DALY
Enterprise IT Solution Provider

Tintri VM-Aware Storage

Fast, Smart, Easy Storage for Virtual Machines

A Daly Webinar presented to MEEC on September 16, 2015

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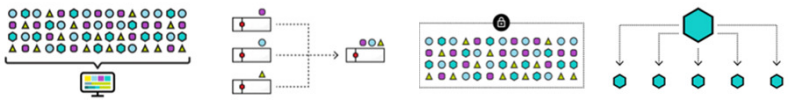
Tintri VMstore
VAS Appliance Overview

"VM-Aware-Storage" (VAS)

- **Per-VM Guaranteed Performance**
- Per-VM Analytics (Global)
- Per-VM Data Management (Global)
- **NO Complex Storage Management**
- Fast, Simple, Reliable, Scalable

Tintri Global Center | ReplicateVM | SecureVM | SyncVM



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It's a Very Noisy Market

hp
COHO DATA
tegile
SOLIDFIRE
PURE STORAGE
EMC²
DELL
Violin MEMORY
pernixdata
simplivity
NUTANIX
NetApp
nimble storage
kaminario

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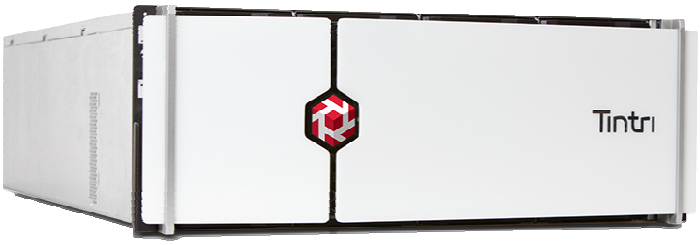

Tintri **VM-Aware Storage (VAS)** Appliances **("VMstore")** storage explicitly designed to natively support virtual machines (VM), across multiple Hypervisors!

No LUNs, No Volumes,
No Complex Storage Management
10 minute install

Tintri **VMstore** delivers superior performance, visibility, scalability, simplicity than you've yet to experience inside your datacenter

Tintri **VM-Aware Storage** Differentiation

- VM-is unit of management / not LUNs or Volumes
- VM-Level Quality of Service & Performance Isolation
- VM-Level Analytics/Visualization; Host, Network, Storage
- VM-Level Automation with PowerShell and REST
- Multi-Hypervisor (vSphere, Hyper-V, RHEV, OpenStack)

Table Stakes: Flash Performance / Thin Provisioning / Dedupe / Compression

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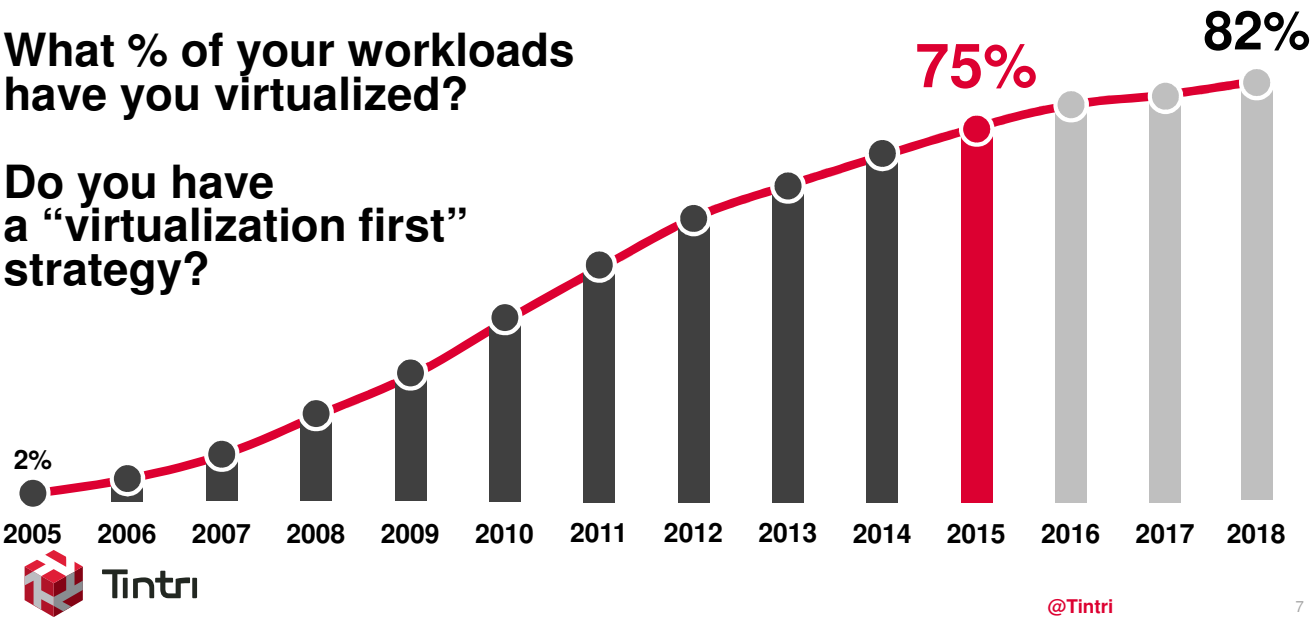
Adoption of Virtualization

What % of your workloads have you virtualized?

Do you have a "virtualization first" strategy?



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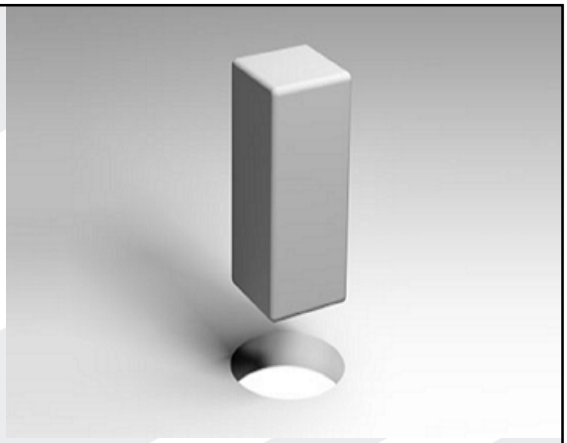
A ***Mismatch*** exists today between your Hypervisors and it's Shared Storage…



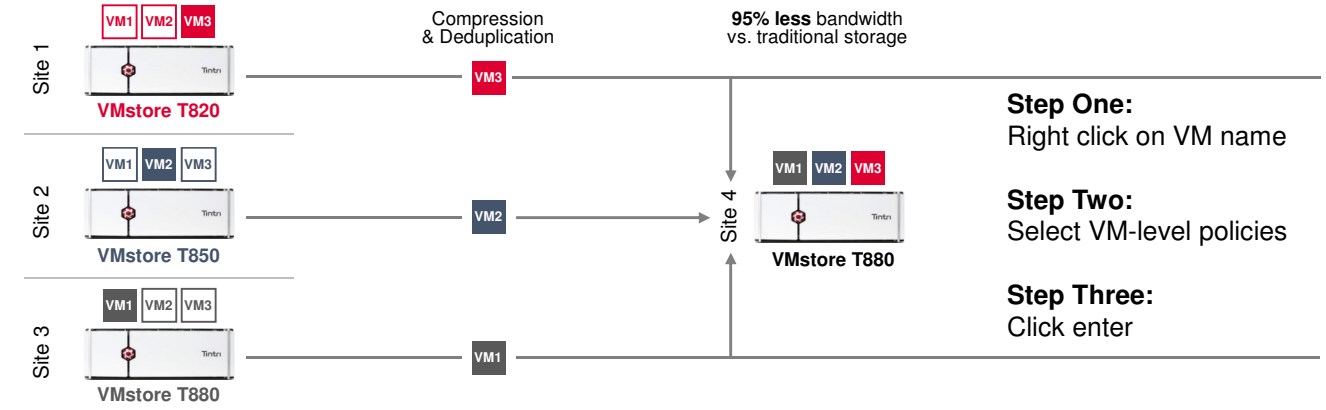
Limitations of LUN-centric storage management for use with virtual machines:

1) Inability to guarantee SLA's on performance, availability, recovery of individual VM(s)
2) Inability to prevent *Throughput-Intensive* VM from stomping on *Latency-Sensitive* VM
3) Inability to quickly troubleshoot VM performance issues or identify exact latency bottlenecks
4) Inability to dynamically select individual VM(s) on which to perform data managment operations;
   - No ability to apply business policy (DR/COOP) at individual VM level (*LUN level only*)
   - No ability save capacity by only creating snapshot or clone on the exact VM(s) you want (*LUN level only*)
5) Scalability challenges
6) Greater the complexity higher the OPEX costs

VM-Level DATA SERVICES
(**snap, clone, replicate, sync**, etc...)

Replicating and backing up entire LUNs wastes capacity and WAN bandwidth.
Tintri reduces WAN usage up to 95% by replicating individual VMs

Multi-Site Awareness | **Per VM Backup & Replication** | **Faster Backup & DR**



Step One:
Right click on VM name

Step Two:
Select VM-level policies

Step Three:
Click enter

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90% of Tintri Install Base were using NetApp, EMC, Dell, HP

FINANCIAL SERVICES
TIAA CREF, The Carlyle Group, charles SCHWAB, Mellon Capital Management, Thomson Reuters

HEALTHCARE
LifeNet Health, GE Healthcare, McKesson, Colorcon, Baxter

MANUFACTURING
Toyota, MillerCoors, Kawasaki, ConAgra Foods, Volvo, Mitsubishi Motors

MEDIA
Dominion Enterprises, DreamWorks, Time Warner Cable, EA, Pixar, Sony

TECHNOLOGY
Dropbox, accenture, vmware, EXOSTAR, cisco, ebay

EDUCATION
The George Washington University, Salisbury University, University System of Maryland, Wake Forest University, University of Arkansas, Northwestern University

PUBLIC SECTOR
Montgomery County Pennsylvania, Suffolk Virginia, U.S. Army, NASA, USDA

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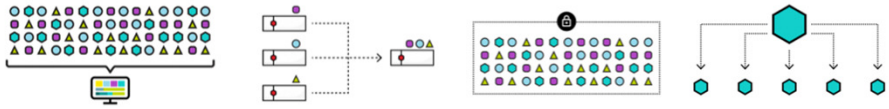
Tintri VM-aware Storage Portfolio

Tintri Global Center | ReplicateVM | SecureVM | SyncVM



VMware Integration:

- vSphere web plugin
- VAAI
- VCAI
- vROps pack
- VIO support
- PowerCLI
- VMware SRM

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Tintri VMstore Series – **Performance, Density, Scale!**

Model	T5080	T5060	T880	T850	T820
Type	All Flash	All Flash	Hybrid Flash	Hybrid Flash	Hybrid Flash
VMs (max)	5,000	2,500	3,500	2,000	750
vDISKS (max)	15,000	7,500	10,500	6,000	2,250
Raw Capacity	23 TB	11.5 TB	78 TB	52 TB	20 TB
Effective Capacity	Up to 73 TB	Up to 36 TB	Up to 100TB	Up to 66 TB	Up to 23 TB
IOPS	200K	120K	106K	75K	30K
Connectivity	(12) 10GbE	(8) 10GbE	(4) 10GbE + (8) 1GbE	(4) 10GbE + (8) 1GbE	(4) 10GbE + (8) 1GbE
Dimensions	2U	2U	4U	4U	4U

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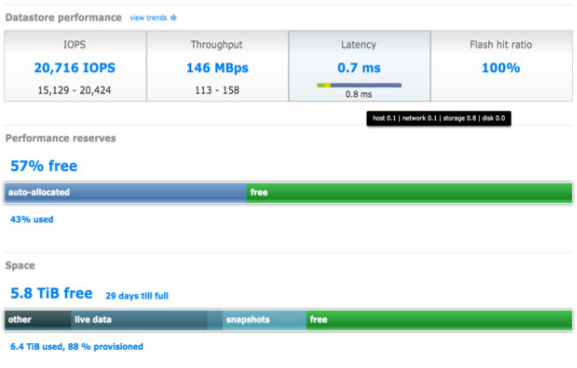
Manageability



Actionable Analytics

Real-time VM-level statistics and trending that allow you to take immediate VM-level action

VM Level Management

No LUNs or volumes. Manage individual VMs

Movers & Shakers

Monitor changing consumption patterns

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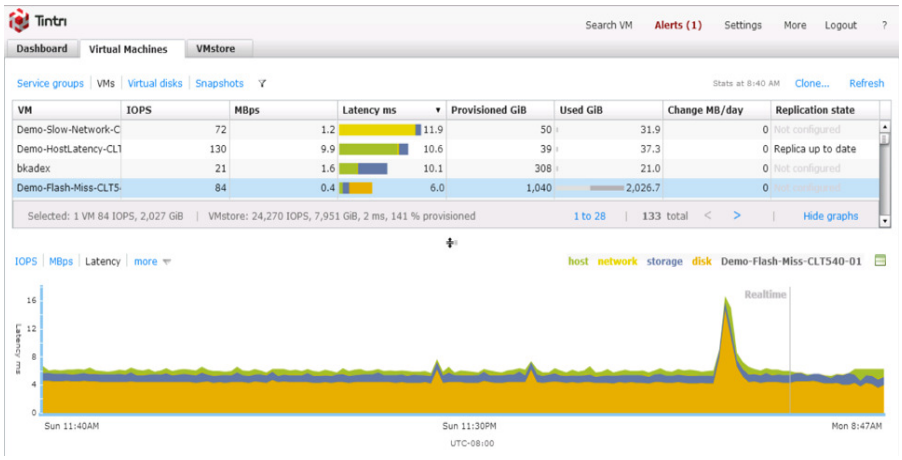
Performance



End-to-End VM Latency

See latency across host, network and storage

Historical per-VM stats

Understand what drives performance pain across time

VM-Level QoS

Every VM gets its own QoS lane and policies

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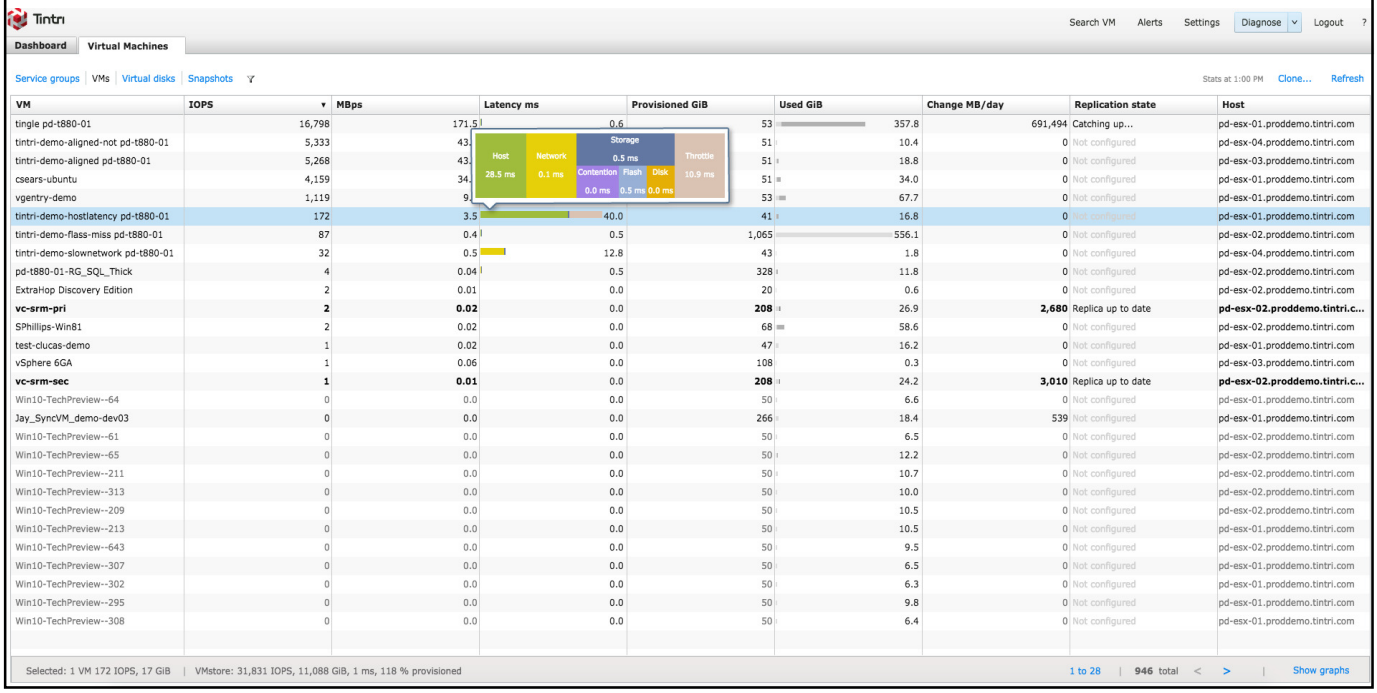
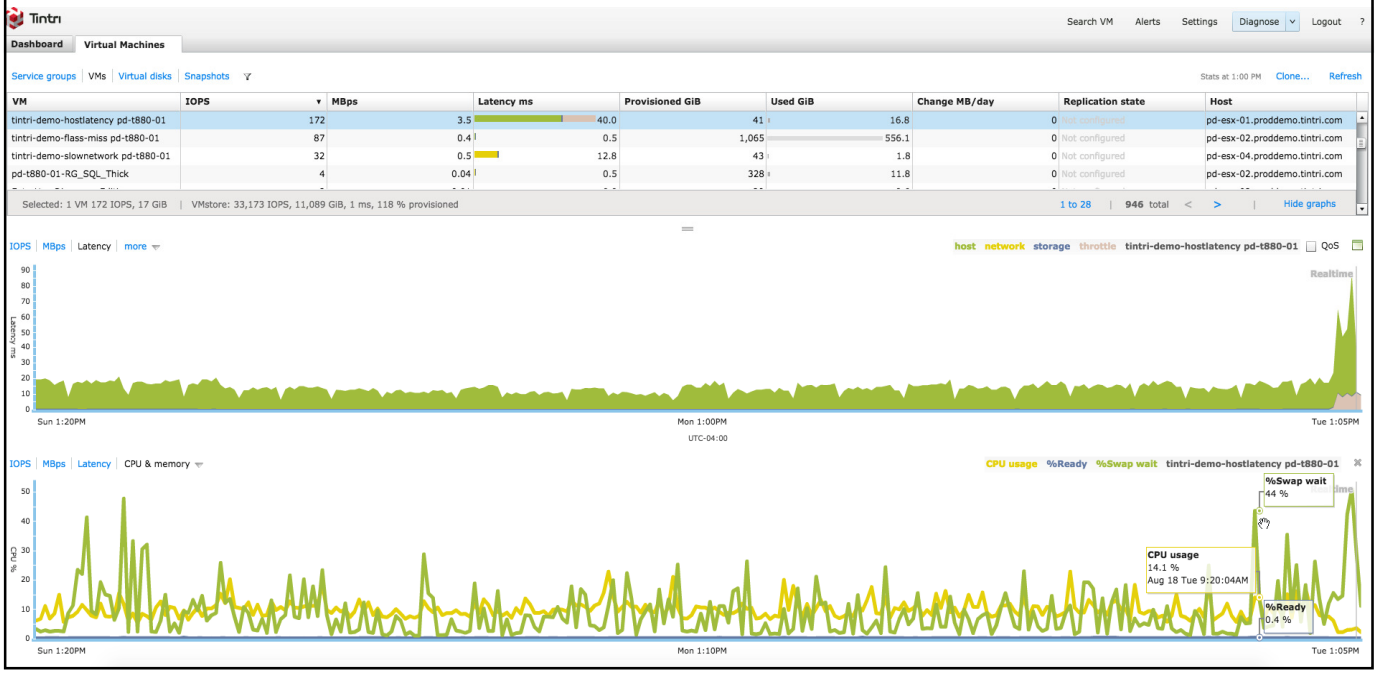
Per-VM Analytics on Storage, Host, Network

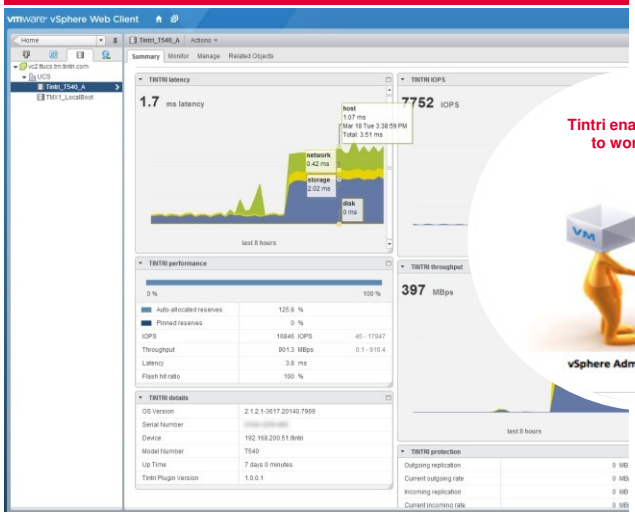


Takes “Guess Work” out of Identifying Root Cause of VM Latency

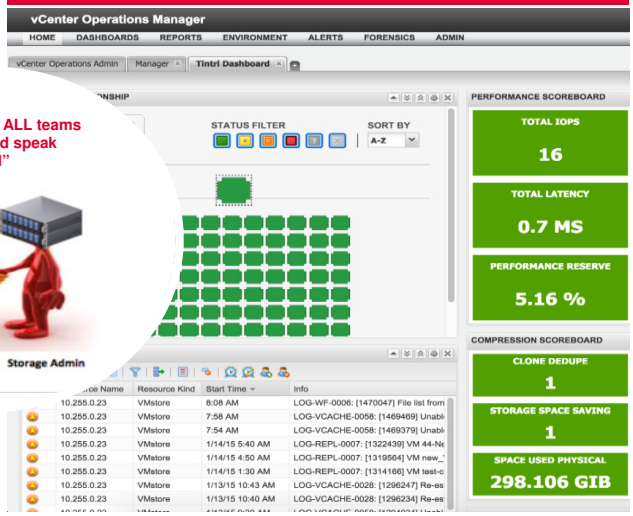


VMware Ecosystem Integration

vCenter plugin 2.0



vRealize Operations Manager



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Tintri for VDI

Why VDI?

Easier-to-Manage

Performance and Mobility

Save Costs

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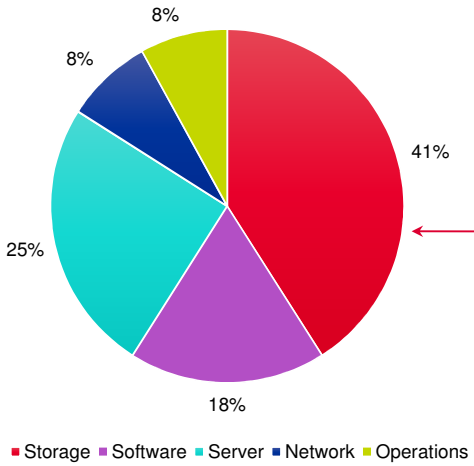
Why Not VDI? The High Cost of Storage



Storage is (at least) **41%** of the cost of VDI:

- Performance bottlenecks
- Mismatch with rest of infrastructure
- Ongoing reshuffling and tuning
- Over-provision or use expensive flash
- Frustrated end users

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I Got 99 Knobs & Storage ain't One

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Virtual Desktop Infrastructure

Conventional Storage

Boot storms and anti-virus scans can bring VDI to its knees

Latency-driven finger-pointing

Over-provisioning –unneeded capacity as band-aid for performance issues

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Virtual Desktop Infrastructure

Conventional Storage	Tintri
Boot storms and anti-virus scans can bring VDI to its knees	Tintri's secret sauce - QoS per-VM plus per-VM Performance Isolation
Latency-driven finger-pointing	Total visibility into root cause of latency, across compute, network and storage
Over-provisioning –unneeded capacity as band-aid for performance issues	Tintri dashboard shows performance gauge and specific VMs impacting resources

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VDI-Enhancing Tintri Technology Features

Simplicity – Single Datastore for all VMs - Mgmt & Desktops

VAAI Offloading (Full Clones)

VCAI Offloading native VMware Cloning process for VMware View

Improve Deployment speeds for Citrix and VMware View

PowerShell Toolkit

Tintri Global Center – Per-VM Analytics & Mgmt at Scale

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Storage Pain & Pressure

Manageability

"In just 10 seconds, Tintri can do what the legacy storage system did in 8 hours.

Performance

"Tintri delivers twice the IOPS at less than 1/3 the latency and ¼ the footprint.

Value

"Now we spend our time adding value for the business instead of managing LUNs.

Reinhart

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ESG Labs on Tintri for VDI

vmware

"**From the time that we actually logged into vCenter to the time we had vCenter migrated to Tintri, it took 8 minutes.**

That's with me not opening the manual, not counting spindles, not calculating an aggregate, not doing anything fancy with vSphere. No tuning, no optimization. 8 minutes to be online. It was really that fast.

This is dead simple!

Tristan Todd, VMware Engineer

Task for 1,000 linked clones	Provisioned	Recomposed	Refreshed	Deleted
Time	**1 hour 37 min.**	**1 hour 52 min.**	**36 min.**	**27 min.**

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Virtual Desktop Infrastructure

Conventional Storage

Boot storms and anti-virus scans can bring VDI to its knees

Latency-driven finger-pointing

Over-provisioning –unneeded capacity as band-aid for performance issues

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QoS per-VM + per-VM Performance Isolation assures no more "noisy neighbor" issues!

Total visibility into root cause of latency, across compute, network and storage

Tintri dashboard shows performance gauge and specific VMs impacting resources

Salisbury University · University System of Maryland · charles SCHWAB · MillerCoors · Mellon Capital Management · The George Washington University · University of Arkansas · Baxter · Wake Forest University · TIAA CREF · Lambton College

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Use Case:
Virtual Desktop Infrastructure

Washington State University

Before

Washington State University struggling to implement VDI due to heavy IOPS demands

Environment

vSphere
View
ESX Hosts

After

"We were blown away by how many IOPS were needed for our VDI deployment. Existing storage systems became the bottleneck. Since implementing the Tintri VMstore for VDI, we don't have performance bottlenecks."

74%
Less admin time

24%
OPEX reduction

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Use Case:
Virtual Desktop Infrastructure

PTS DATA CENTER SOLUTIONS

Before NetApp arrays not providing enough IOPS for VDI, and no visibility into storage performance

Environment
vSphere
Horizon View

After

Our new Tintri array is providing much higher IOPS than the NetApp devices. Tintri is a much easier storage environment to manage.

The approach to VM and application-aware storage is a game changer.

6x Faster performance

<20 min Install & config

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Use Case:
Virtual Desktop Infrastructure

WASHINGTON STATE UNIVERSITY

Before EMC arrays could not deliver enough IOPS to support 400 virtual desktops and 100 servers.

Environment
vSphere
Horizon View

After

Tintri is the only game in town—the only storage designed for the demands of virtualized environments.

All of the complexity of conventional storage is gone—with Tintri, our VDI just works.

2000 Desktops on 1 VMstore

<3 sec. Time to add 1 desktop

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Choices, Choices…. Hybrid-Flash or All-Flash?

Classic IT Response… "It depends"

Most VDI Scenarios

Tintri VMstore T800 Series

OR

Full persistent desktops svMotioned from other storage

Dedupe efficiency

Tintri VMstore T5000 Series

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Taneja Group Validation

Based on Interviews with Tintri Customers

Observed mixed R/W Performance per VMstore

6x better than comparable systems

Capacity Advantage

10x more than mid-range storage

Routine Management Time and Effort at Scale (8,000 VMs)

52x advantage

Estimated annual management time and effort impact

60x reduction

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Thank you

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Don't Miss The Daly Technology Showcases Coming Next Month!

October 14
Westin Richmond
Richmond, VA

October 16
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Baltimore, MD

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