

Virtualization in storage infrastructure

Virtualization³
Hotel Mons, 12.11.2009

Iztok Sitar, *Account Technology Consultant*



EMC Enabling Technology



intelligent storage

widest set of storage choices

full VMware integration

“single giant array”

fully automated storage tiering

information management

deduplication for VMware

SRM-integrated business cont.

archiving of virtualized data

optimized vClient solutions

resource management

vCenter plug-ins

VM-aware discovery

VM-aware ITIL workflows

VM-aware IT compliance

information security

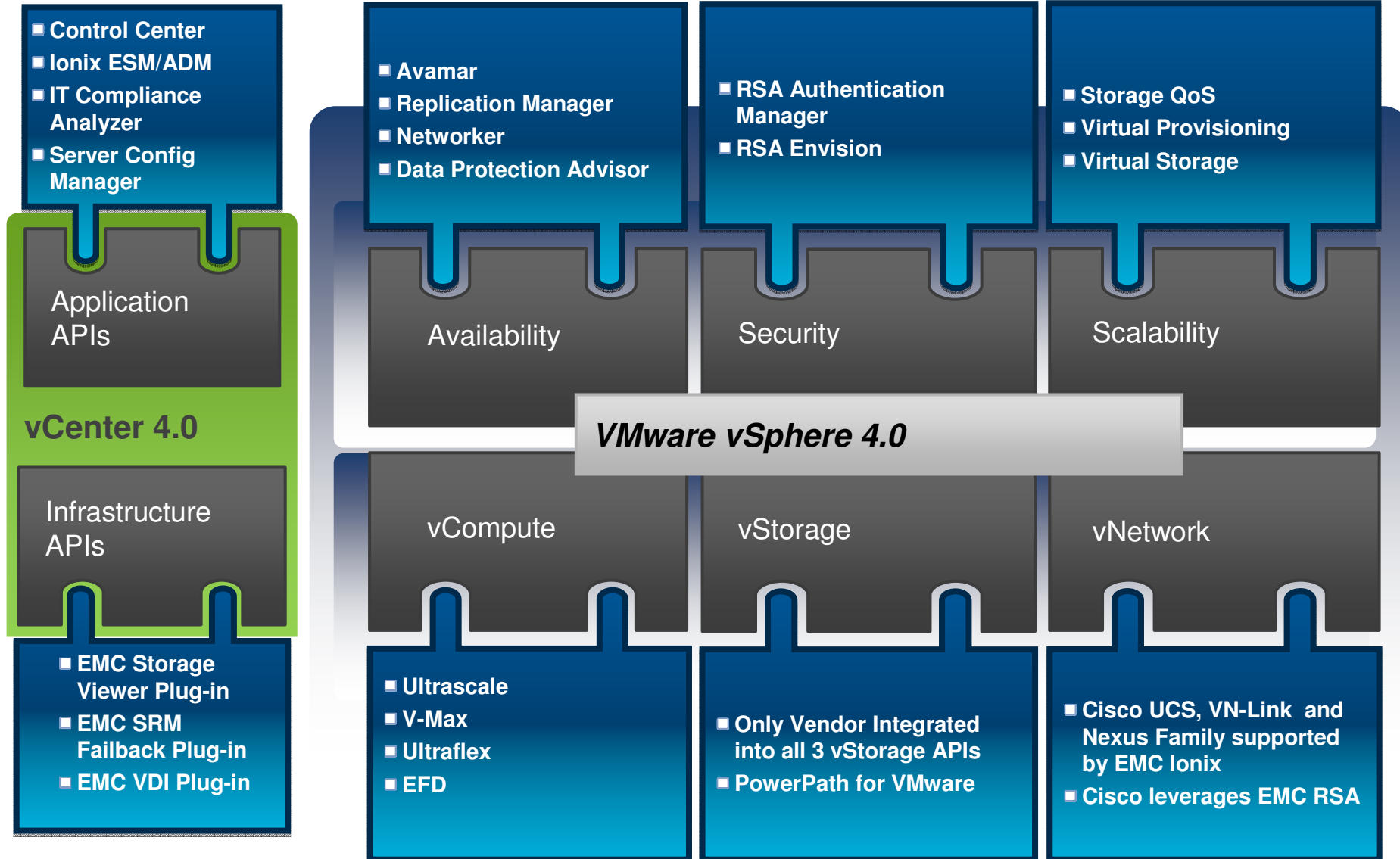
encryption and key mgmt

advanced authentication

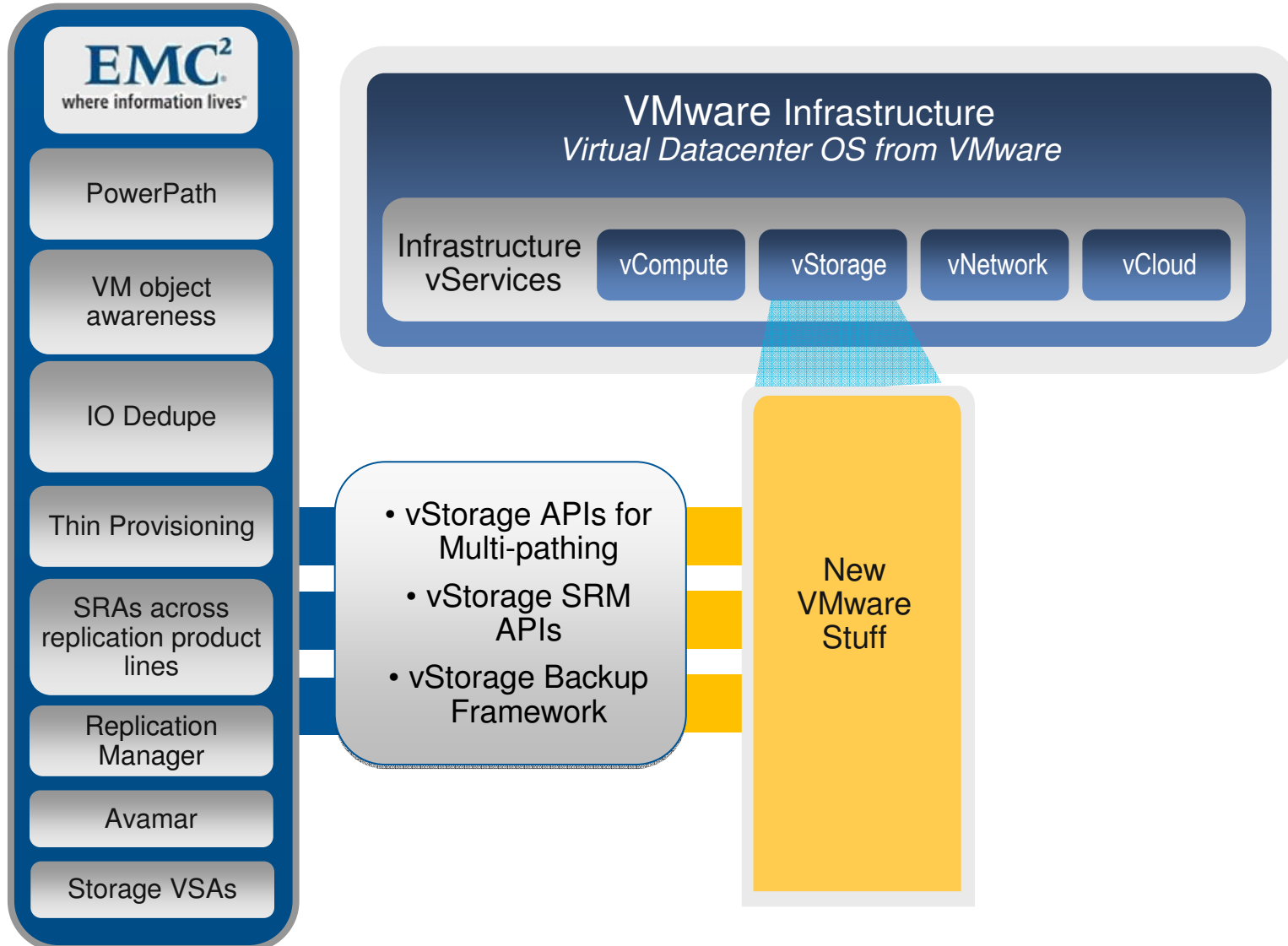
data loss prevention

auditing and compliance

EMC and vSphere Integration



What's Coming from EMC vStorage



What's Coming from EMC vStorage



4x better availability, 3x better scale



PowerPath

VM object awareness

IO Dedupe

Thin Provisioning

SRAs across replication product lines

Replication Manager

Avamar

Storage VSAs

Storage Manageability

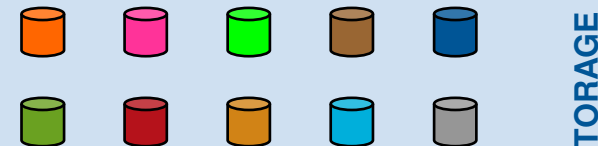
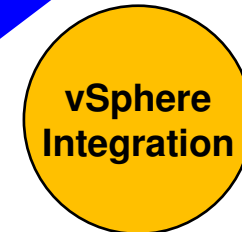
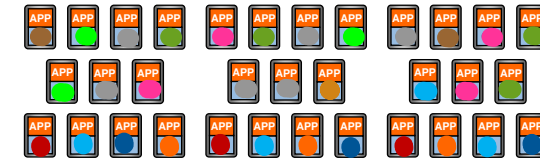
- Simplified Provisioning
- Predictable and Consistent Performance
- Optimize server, storage, and data-path utilization

5-9's App / VM Availability

- Automatic Fault Recovery
 - HBA
 - Path
 - Storage Processor

Platform Support

- FC, iSCSI, FCoE
- Symmetrix
- CLARiiON,
- Celerra iSCSI
- RDM and VMFS



STORAGE

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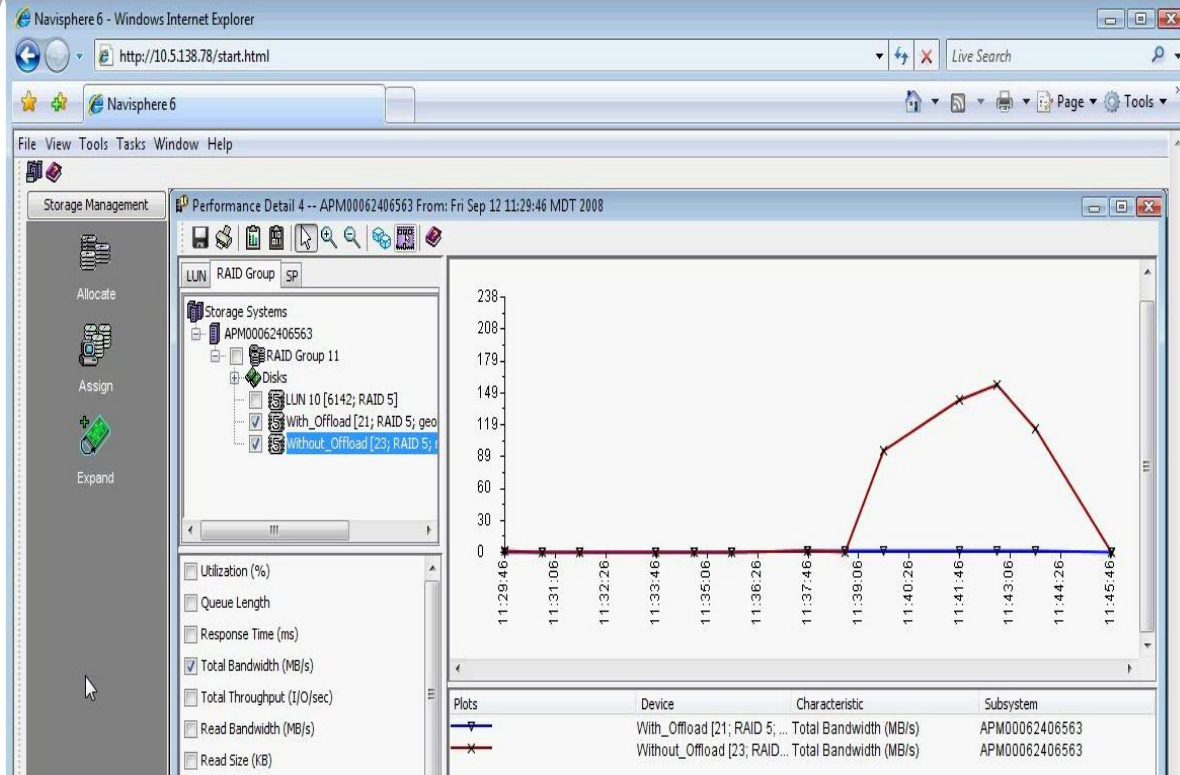
Avamar

Storage VSAs

4x better availability, 3x better scale

"Hardware Offload" (future)

2x less IO, 10x faster provisioning (future)



Array Offload of I/O Intensive Operations

- Reduce network traffic
- Reduce ESX workload
- Drastically increase completion time of operations

Array will be able to perform block-level operations on VMs

Not Everyone Needs Uber-managers...



The screenshot shows the VMware Infrastructure Client interface. The left pane displays a tree view of hosts and clusters, including 'Cluster20' with various VMs. The main pane shows the configuration for 'r5c4s10vdi.vdi.emc.local VMware ESX Server, 3.5.0, 110268'. The 'EMC Storage' tab is active, showing a 'Storage' section with 'LUNs' selected. A table titled 'EMC Storage LUNs' is displayed, listing various LUNs with their canonical names, models, revisions, arrays, devices, types, RAID configurations, capacities, and other attributes.

Canonical	Model	Revision	Array	Device	Type	RAID	Capacity	META	VP	Datstore
vmhba1:9:27	SYMMETRIX	5773	000190103899	03D23	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:29	SYMMETRIX	5773	000190103899	03D2B	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:26	SYMMETRIX	5773	000190103899	03D1F	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:11	SYMMETRIX	5773	000190103899	03CE3	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:59	SYMMETRIX	5773	000190103899	03DA3	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:13	SYMMETRIX	5773	000190103899	03CEB	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:10	SYMMETRIX	5773	000190103899	03CDF	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:61	SYMMETRIX	5773	000190103899	03DAB	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:43	SYMMETRIX	5773	000190103899	03D63	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:31	SYMMETRIX	5773	000190103899	03D33	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:28	SYMMETRIX	5773	000190103899	03D27	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:45	SYMMETRIX	5773	000190103899	03D6B	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:42	SYMMETRIX	5773	000190103899	03D5F	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:30	SYMMETRIX	5773	000190103899	03D2F	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:15	SYMMETRIX	5773	000190103899	03CF3	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:12	SYMMETRIX	5773	000190103899	03CE7	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:63	SYMMETRIX	5773	000190103899	03DB3	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:60	SYMMETRIX	5773	000190103899	03DA7	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:14	SYMMETRIX	5773	000190103899	03CEF	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:62	SYMMETRIX	5773	000190103899	03DAF	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:47	SYMMETRIX	5773	000190103899	03D73	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:44	SYMMETRIX	5773	000190103899	03D67	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:46	SYMMETRIX	5773	000190103899	03D6F	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:58	SYMMETRIX	5773	000190103899	03D9F	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:1	SYMMETRIX	5773	000190103899	03CBB	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:19	SYMMETRIX	5773	000190103899	03D03	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:33	SYMMETRIX	5773	000190103899	03D3B	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:21	SYMMETRIX	5773	000190103899	03D0B	TDEV	RAID_6	128.00 GB	Concate...	Yes	
vmhba1:9:3	SYMMETRIX	5773	000190103899	03C33	TDEV	RAID_6	128.00 GB	Concate...	Yes	

What's Coming from EMC vStorage



- 4x better availability, 3x better scale
- "Hardware Offload" (future)
- 2x less IO, 10x faster provisioning (future)
- Save 40% of your storage cost

PowerPath

VM object awareness

IO Dedupe

Thin Provisioning

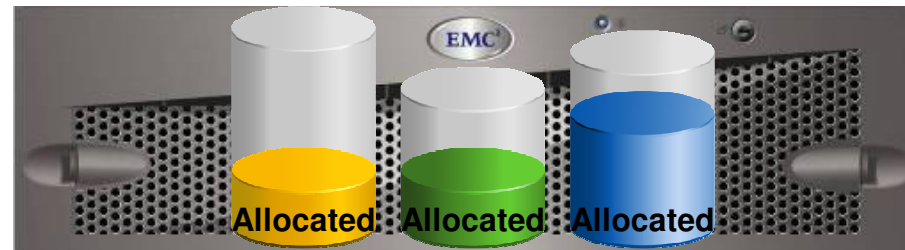
SRAs across replication product lines

Replication Manager

Avamar

Storage VSAs

Virtual Machines



Thin LUN Technology

Storage Pool

What's Coming from EMC vStorage



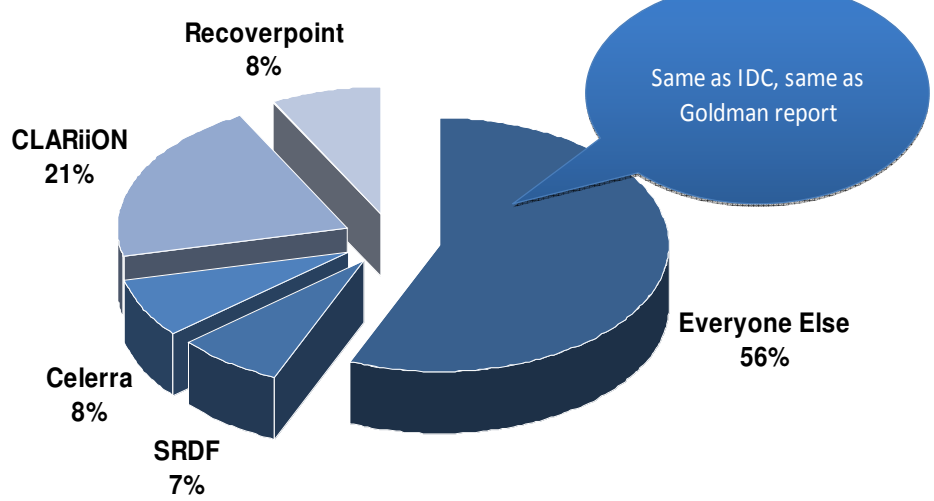
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- Easier DR testing, 10x easier DR

- PowerPath
- VM object awareness
- IO Dedupe
- Thin Provisioning
- SRAs across replication product lines**
- Replication Manager
- Avamar
- Storage VSAs

"I ran 13 sessions of the hands on LAB for SRM at VMworld 2008 and 80% were looking to integrate this with EMC storage ..As well as from a pure documented solution, EMC is the winner by far at this time ... Just my 2 cents ..."
 Rodney Rock – VMware Sr. Systems Engineer

"I'd say at least 75% of the traffic visiting the SRM booth at VMworld asked questions about SRM on top of EMC storage and replication." – Jonathan McCormick, VMware Sr Systems Engineer

SRM Downloads Since Launch



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IO Dedupe

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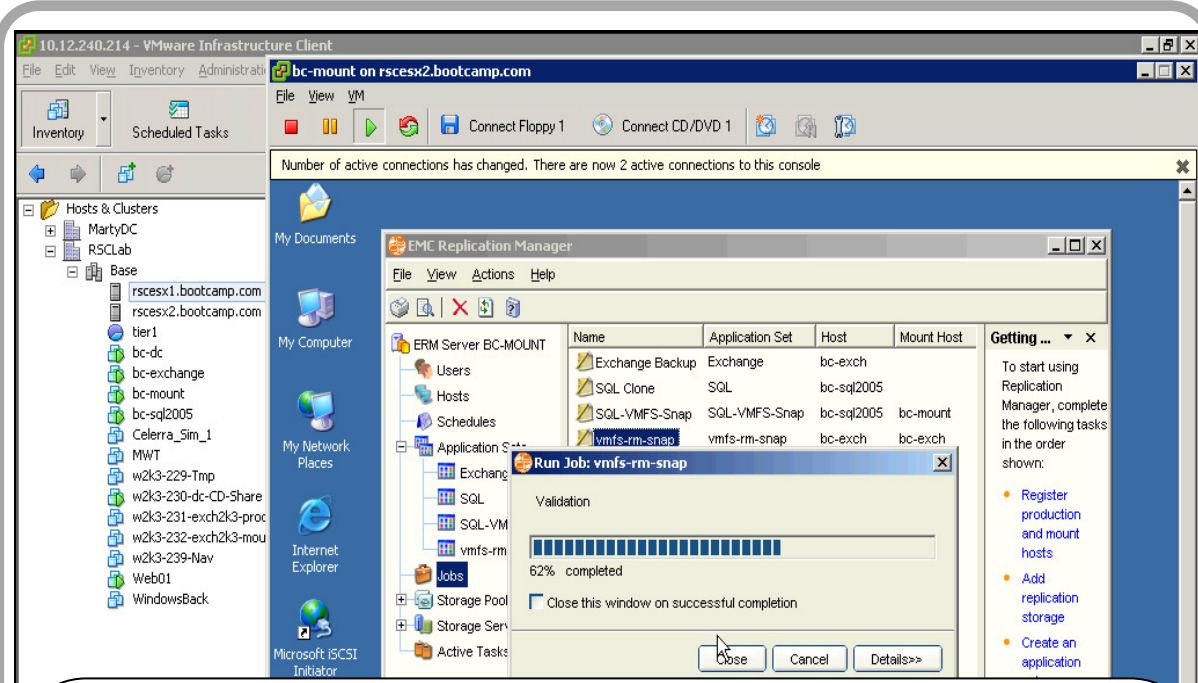
SRAs across replication product lines

Instant VM Recovery

Replication Manager

Avamar

Storage VSAs



EMC Replication Manager

- Integrates array snapshots with VMware
- Instant recovery at single VM & Datastore levels
- Automated Replication and Backup Scheduling
- Exchange, SQL, Oracle, and VMware Consistent Snapshots
- Application Integrated Backup (VSS, Oracle hot backup)

What's Coming from EMC vStorage



- 4x better availability, 3x better scale → PowerPath
- “Hardware Offload” (future) → VM object awareness
- 2x less IO, 10x faster provisioning (future) → IO Dedupe
- Save 40% of your storage cost → Thin Provisioning
- Easier DR testing, 10x easier DR → SRAs across replication product lines
- Instant VM Recovery → Replication Manager
- Save 500%, get 2x consolidation → **Avamar**
- Storage VSAs

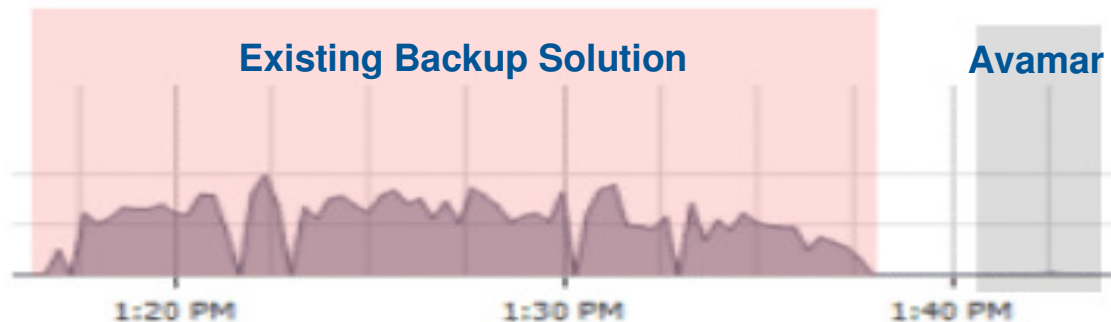
VMware and Source-based Dedupe Backup

Real-world results:

Customer analysis: Jan 4 – Feb 5, 2009

Host Name	New Data	Total Data-set	% Saved	Avg Daily BU Time
ora-edwprod-d1	17.43 GB	126.27 GB	86.20%	1.06 hrs
ora-dmqa-d1	10.16 GB	132.45 GB	92.33%	0.77 hrs
ftpsite	21.25 GB	415.89 GB	94.88%	0.67 hrs
ora-test-siebel-d1	5.63 GB	203.15 GB	95.86%	1.73 hrs

Network Usage



What's Coming from EMC vStorage

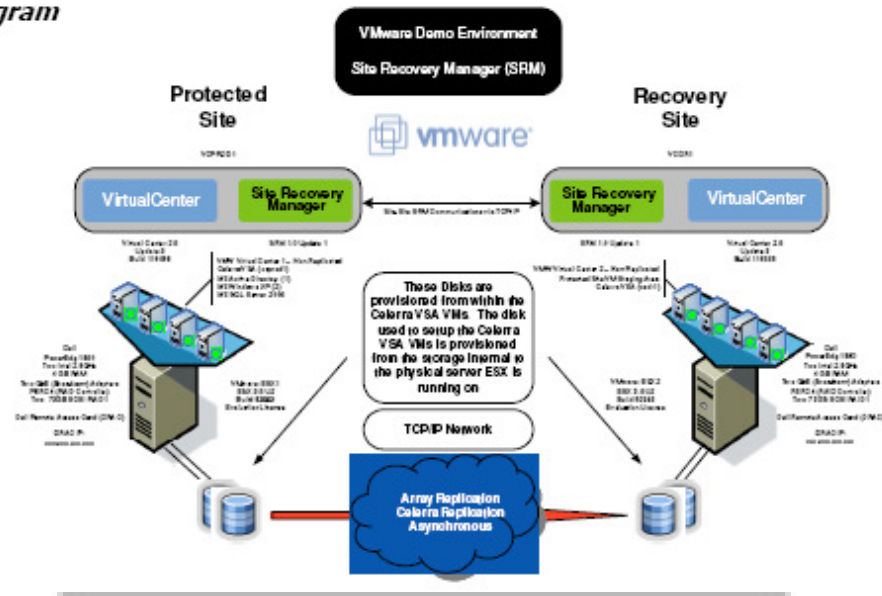


- 4x better availability, 3x better scale
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- Save 40% of your storage cost
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- Partner Tools

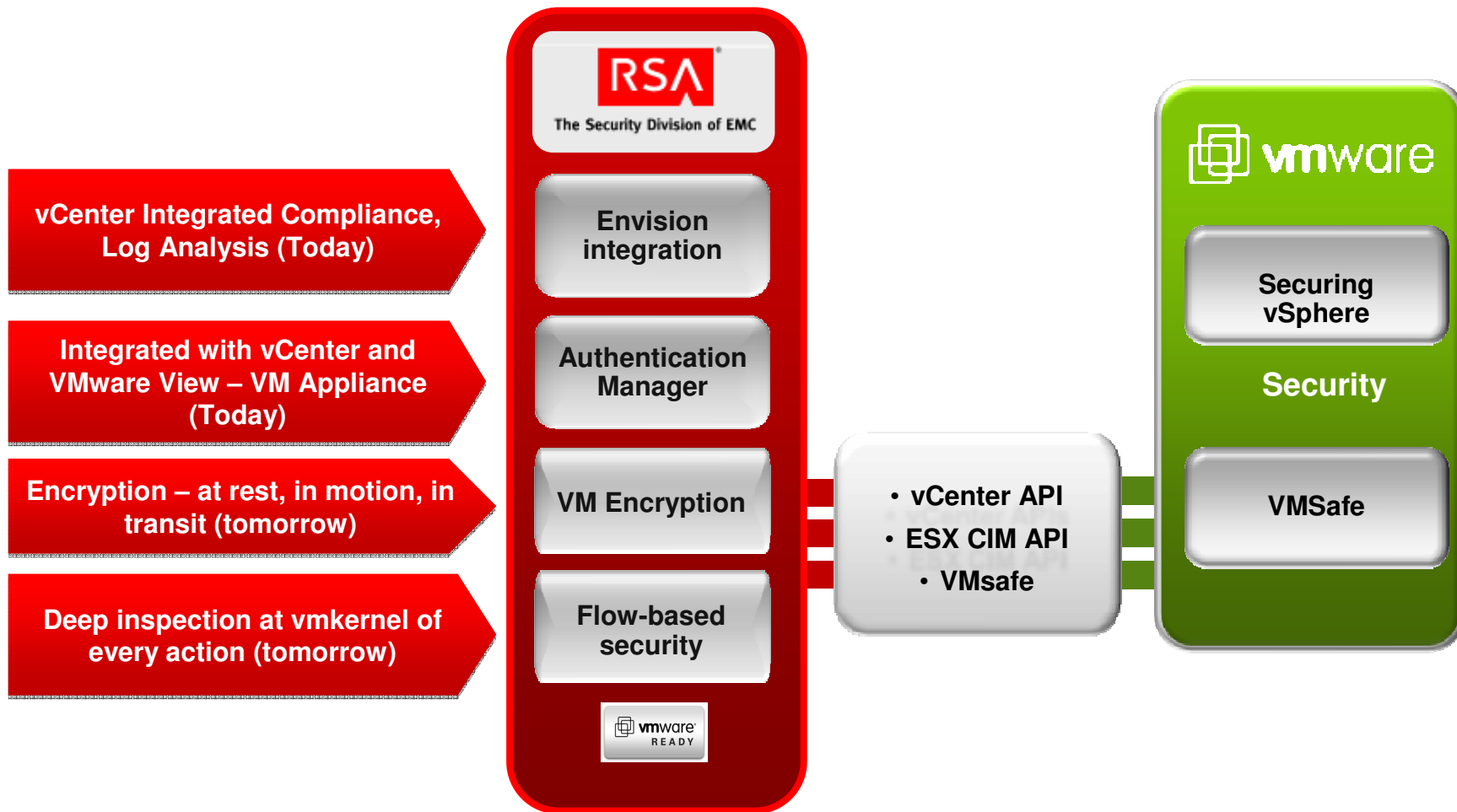
- PowerPath
- VM object awareness
- IO Dedupe
- Thin Provisioning
- SRAs across replication product lines
- Replication Manager
- Avamar
- Storage VSAs**

EMC Celerra Virtual Storage Appliance (VSA) & VMware Site Recovery Manager

Diagram



Example: How we are Building our Security Suite for the 100% Virtualized Datacenter

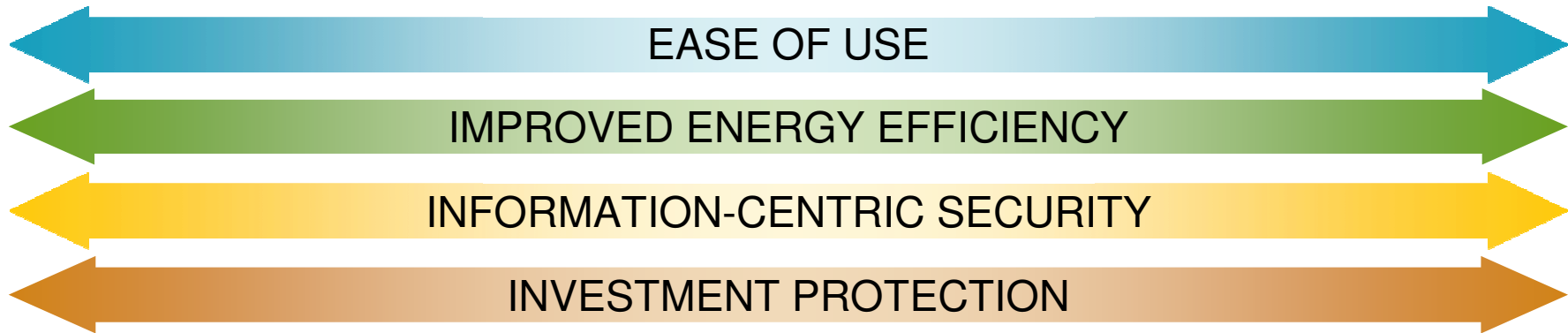


EMC's Storage Innovation



Broadest Range of Function, Performance, and Connectivity

DataDomain New DD530 DD660 DD880	Centera New EMC Centera 4-LP Node	CLARiiON CX4 UltraScale Series New Flash Drives Fibre Channel and iSCSI AX4	Celerra NAS, FC, & iSCSI New Flash Drives NS20 NS40G NS80G Rainfinity Global File Virtualization	Invista 2.0 SAN Virtualization	Connectrix SAN Connectivity	Symmetrix DMX-3 and DMX-4 New Flash Drives DMX-3 950 DMX-4 950 Symmetrix V-Max Series
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The image features a dark, futuristic background with a blue light source in the upper right corner, creating a lens flare effect. A prominent blue diagonal line runs across the lower half of the frame. The word "SYMMETRIX" is rendered in a metallic, 3D block font, positioned centrally and slightly angled. The overall aesthetic is high-tech and professional.

SYMMETRIX

EMC Symmetrix V-Max.
Built on the industry's first Virtual Matrix Architecture

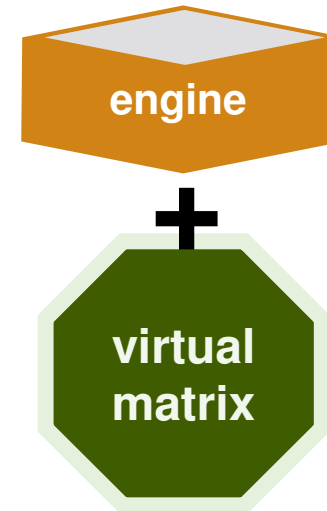
The Impact of Storage Architecture



start small

- 8-16 ports
- 16 processor cores
- 32-128 GB of memory
- 48-256 drives

**can be uniquely
assembled into
extremely large arrays**



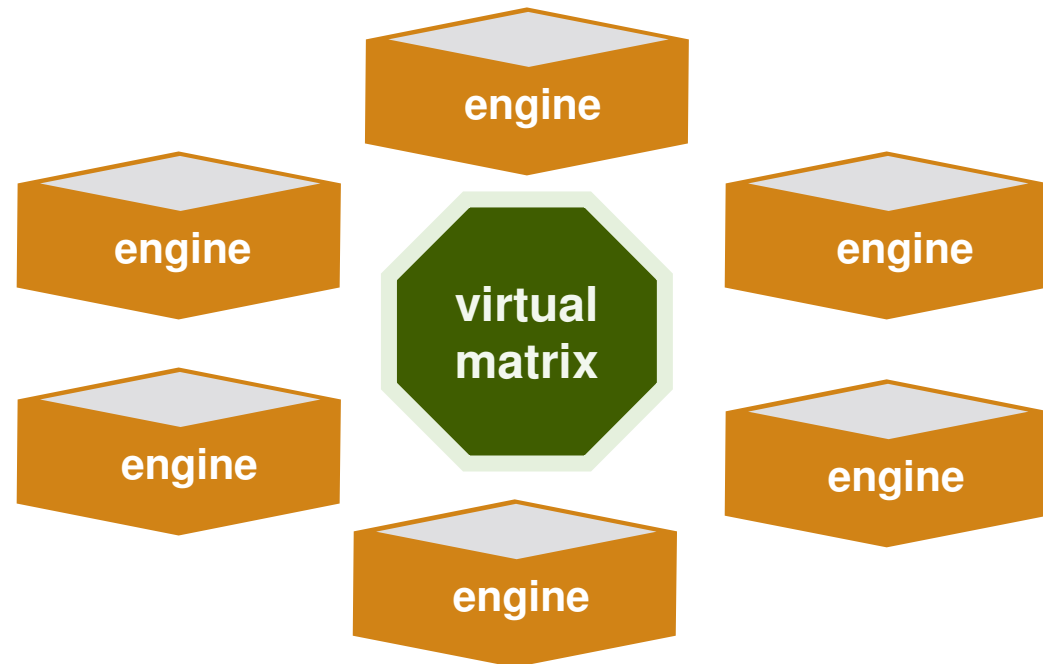
The Impact of Storage Architecture



get big

- hundreds of ports
- hundreds of cores
- TB's of memory
- thousands of disks

**build a large array
from smaller ones**



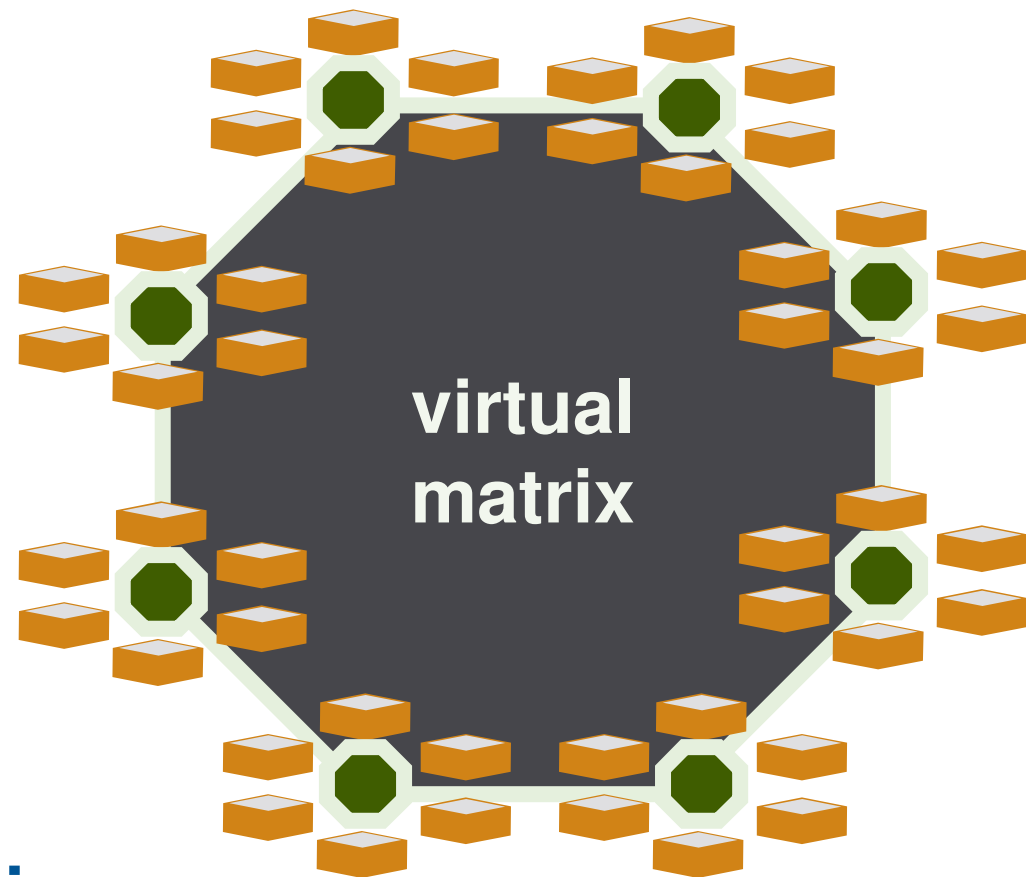
The Impact of Storage Architecture



get *really* big

future

- thousands of ports
- thousands of cores
- hundreds of TB of memory
- tens of thousands of disks
- multiple frames, multiple locations

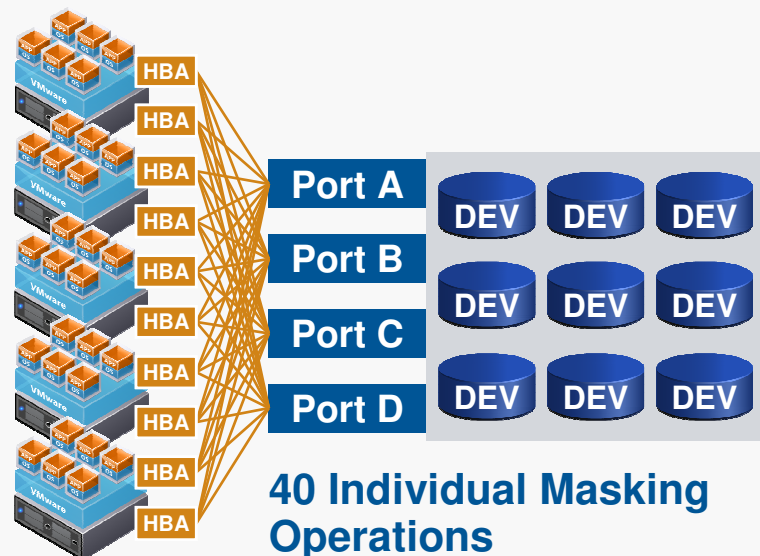


a single, giant enterprise array

Easy, Quick, and Automated Storage Provisioning for Virtual Servers with a Single Action



Traditional Mapping and Masking



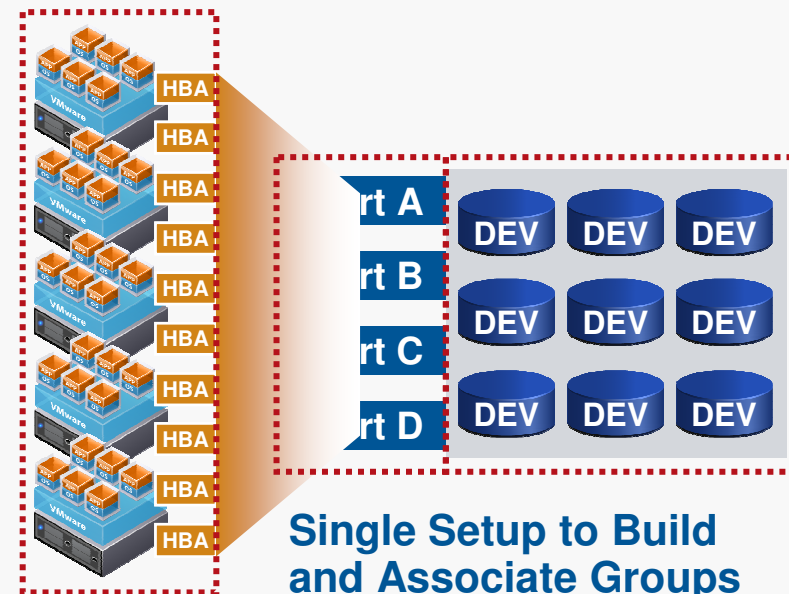
40 Individual Masking Operations

5 ESX servers x 2 HBAs x
4 storage ports

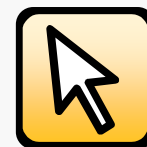


~160 clicks to complete
Includes initial configuration and repeated for every change or add

Auto-provisioning Groups New



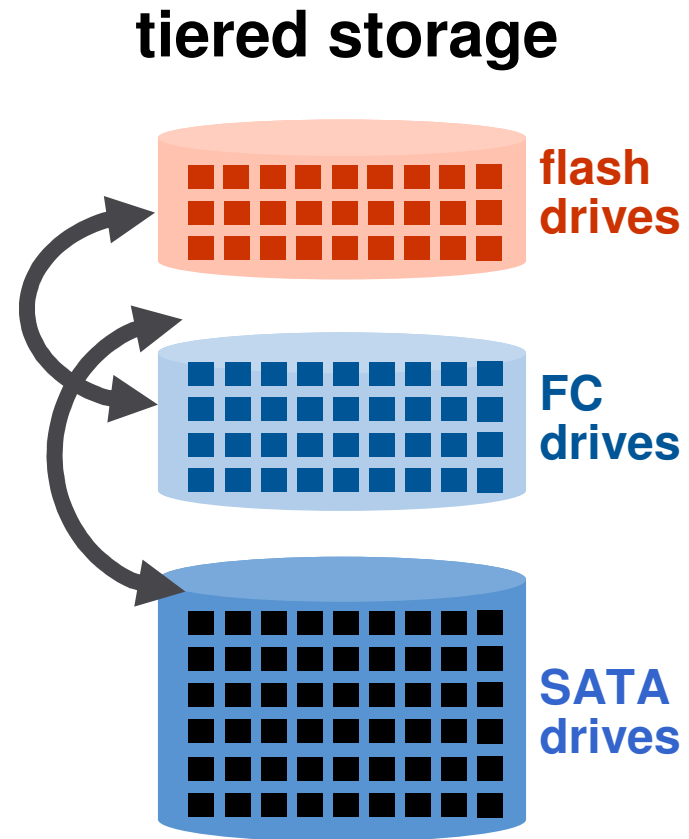
Single Setup to Build and Associate Groups



15 clicks to complete
Simplifies initial configurations and all future changes and additions

FAST

automates
movement and
placement of data
based on
changing needs



Flash Drives Shatter Performance Barriers



Unprecedented Application Performance Characteristics

30x IOPS improvement

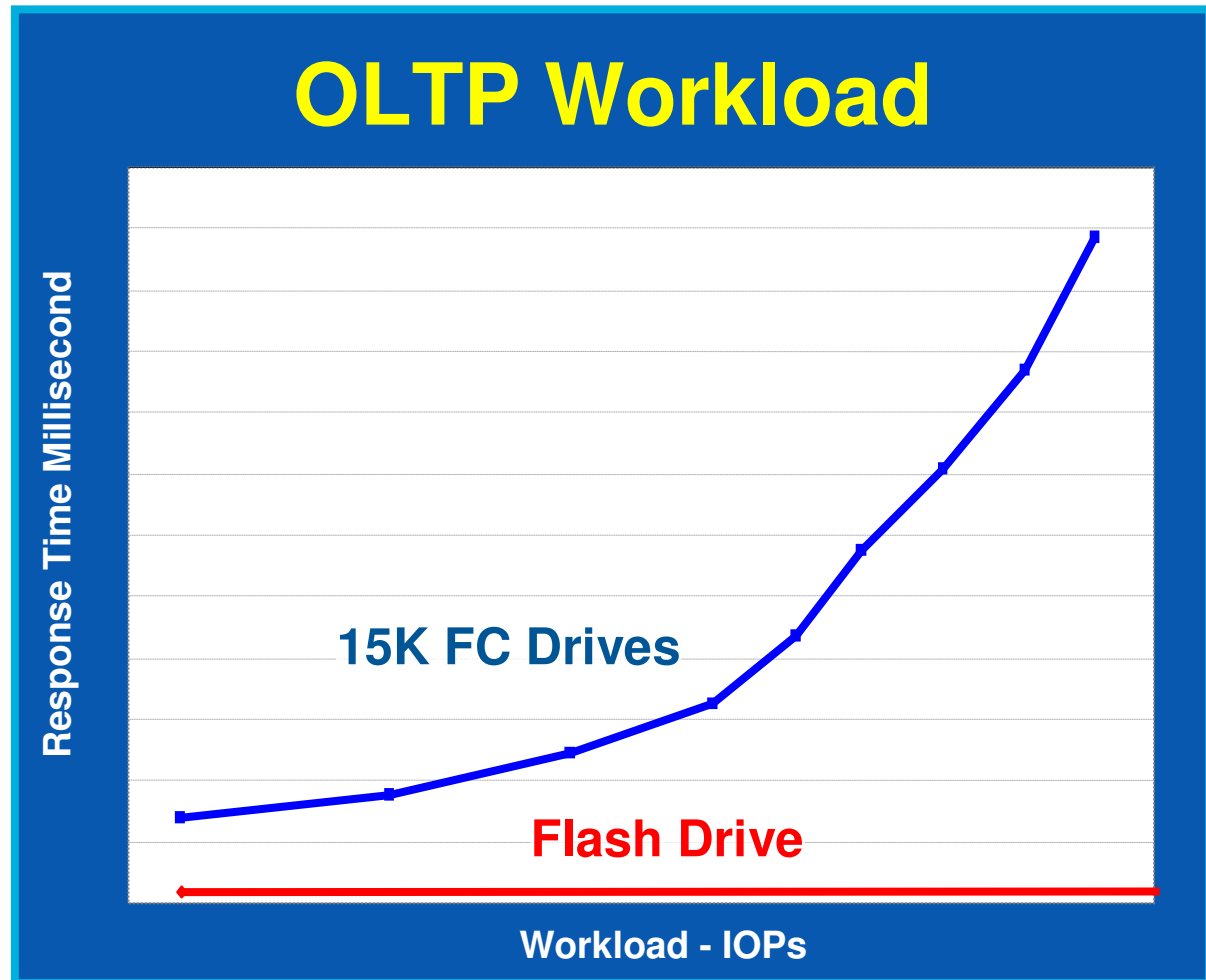
10x faster response time

38% less power per drive

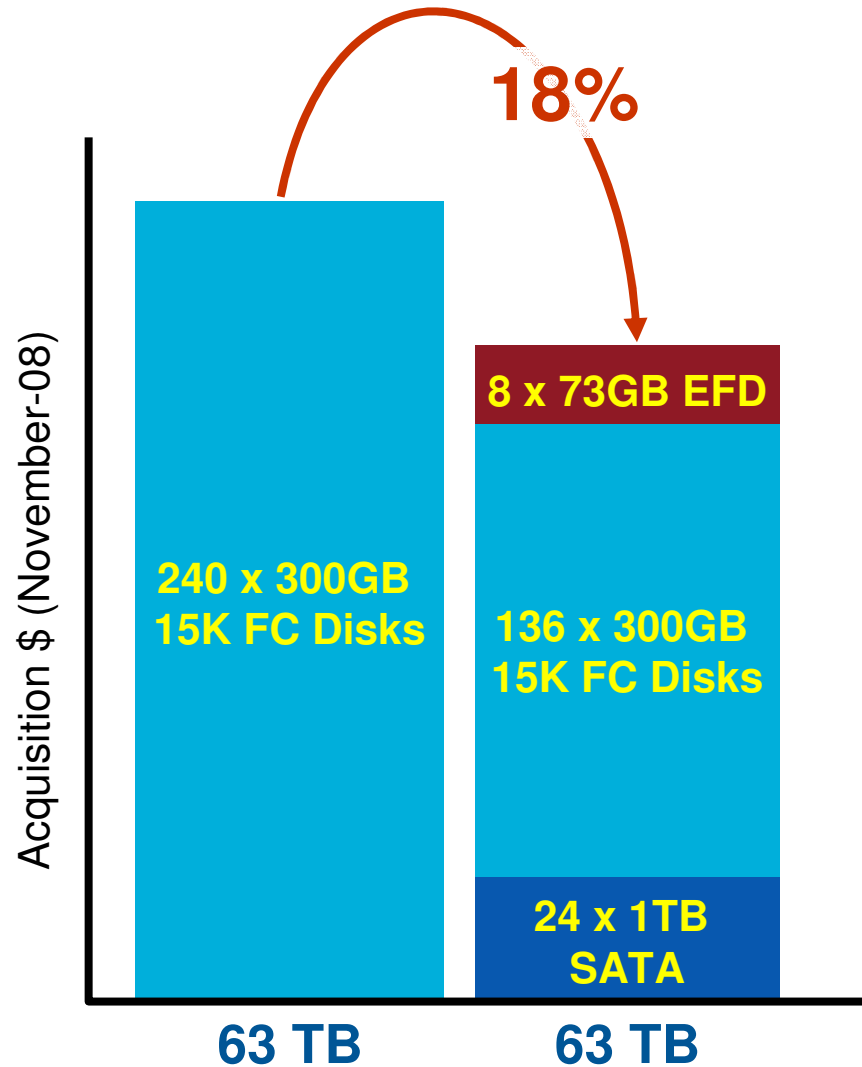
98% less power per IO

58% less weight per TB

Reliability - no moving parts



Efficiency is not just for Servers Anymore



18% Lower Storage Costs
+ Reduce Maintenance & SW costs

60% More Disk IOPS
64,000 vs 40,000 Aggregate IOPS*

17% Less Power & Cooling
6.48 kVA vs 7.82 kVA

30% Fewer Disk Drives
168 EFD+FC+SATA vs 240 FC

* EFD = 5,000 IOP/disk
FC 15K = 167 IOP/disk
SATA = 80 IOP/disk

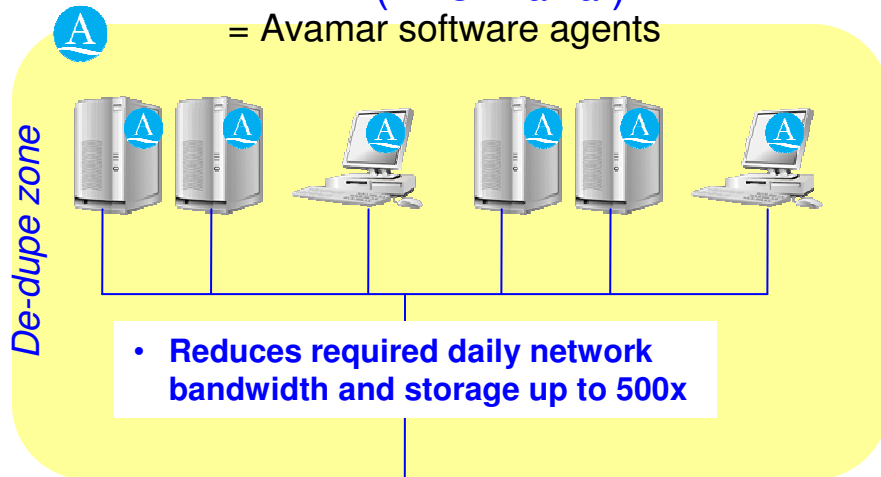
De-duplication



Source de-duplication

(EMC Avamar)

= Avamar software agents



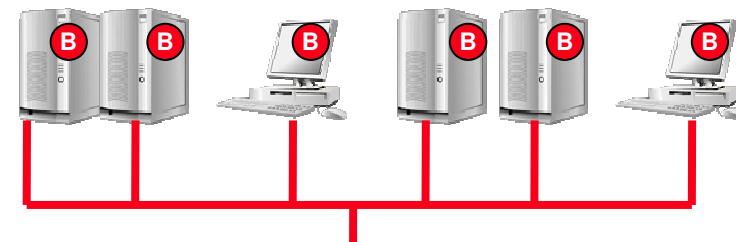
Avamar Server

- Up to 50:1 reduction in total storage
- Daily full backups
- Single-step recovery

Target de-duplication

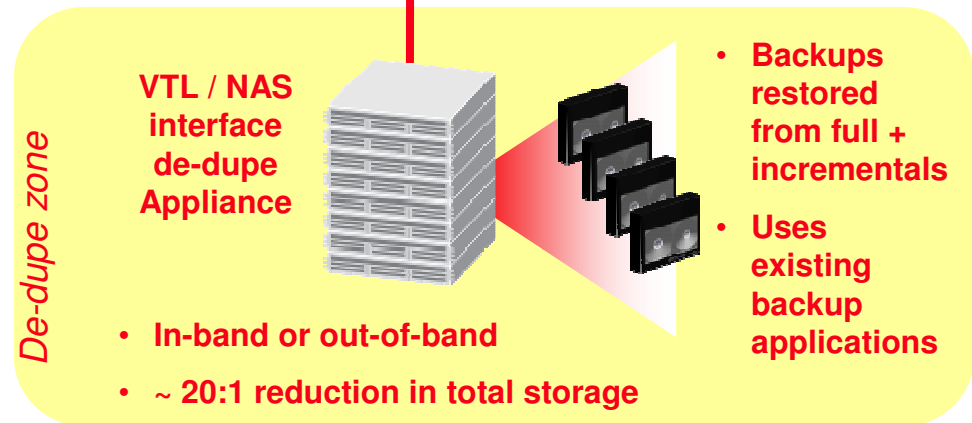
(EMC Data Domain)

B = traditional backup software agent (no de-dupe)



- Traditional full + incremental backups move ~200% of primary data weekly!

Traditional Backup SW & Server



Unified Vblock Element Management

Single Point of Management, Extensible Integration Framework



- **Unified Vblock Management Interface**

Consolidated view into all Vblock infrastructure
Single integration point

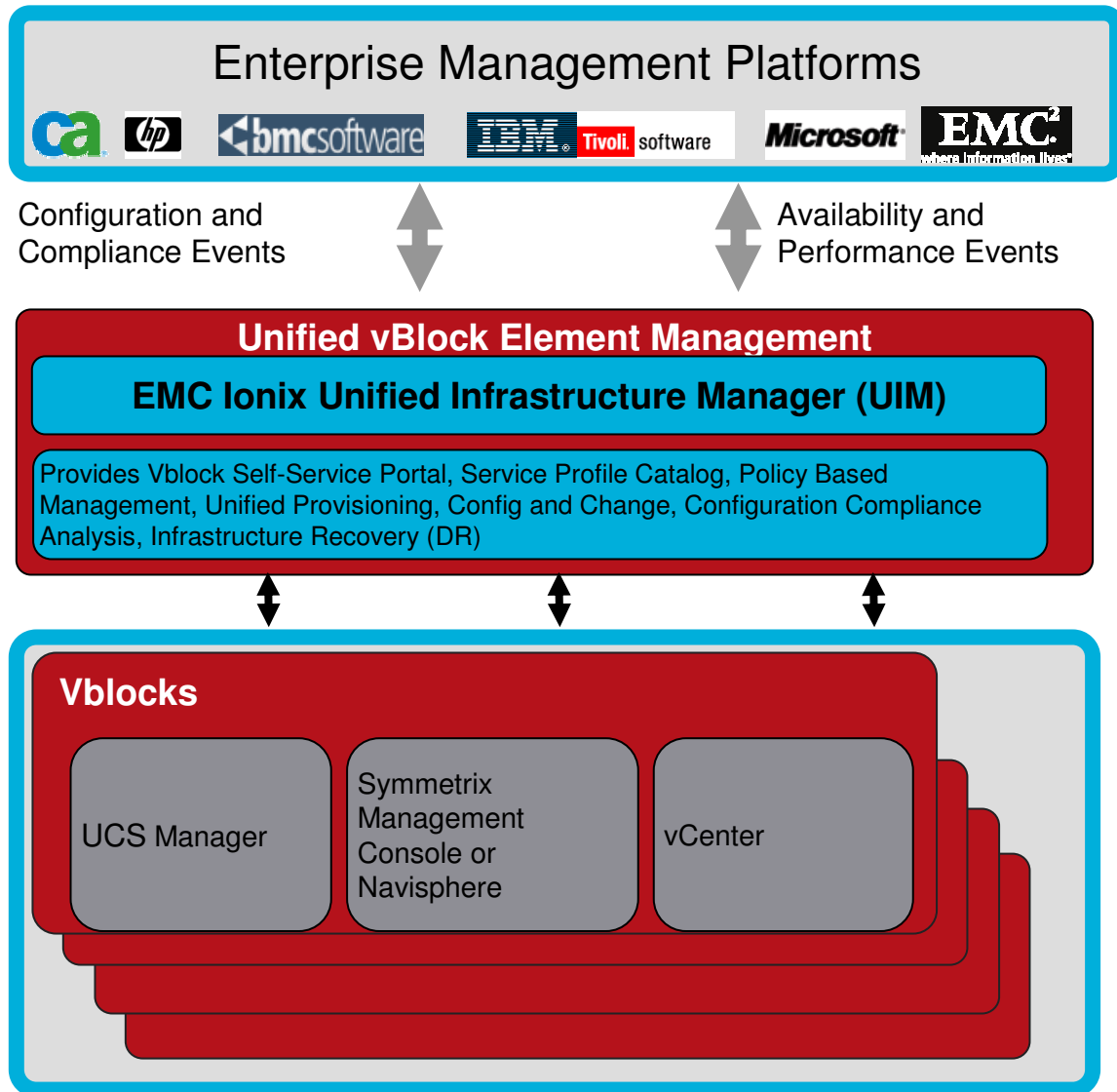
- **IT self-service portal**

Mini service catalog and dashboard for self-provisioning

- **Policy-based management**

Fine-grained tracking, traceability, reproducibility
System-wide compliance and remediation

- **Automated discovery and deployment**



Our Own Experiences With Data Center Virtualization



EMC Statistics

4068 VMs on 272 ESX servers
First Rollout - 5:1 (adhoc)
New Norm - 40:1 using vPods
Virtual Desktops – 800 now, 100% EOY
100% Virtualized EOY, including 60K Exchange 2007 mailboxes

Savings

\$42M saved from Storage Consolidation
\$13M saved from Server Virtualization (\$80M cost avoidance)
\$30M datacenter build avoided
64% Reduction in on-going Power Consumption
Deployment time reduced from 8 weeks to 3 days

Cisco Statistics

14,250 servers, 3,780 apps
2,720 VM's on 162 ESX Servers
50% of existing, 75% of all new servers virtualized

Savings

\$19+ Million in Server Virtualization
\$50+ Million from Storage Consolidation
Deployment time reduced from 8-12 weeks to 3 days

The image features the EMC logo and tagline centered on a blue background with a sunburst effect. The logo consists of the letters 'EMC' in a large, bold, blue serif font, with a superscript '2' to the right of the 'C'. A registered trademark symbol (®) is located below the 'C'. Below the logo, the tagline 'where information lives' is written in a smaller, bold, black sans-serif font, also followed by a registered trademark symbol (®).

EMC²
®

where information lives
®