

Maximize Your Virtual Environment Investment with EMC Avamar

Gene Maxwell

Virtualization is the First Step on the Journey to the Private Cloud



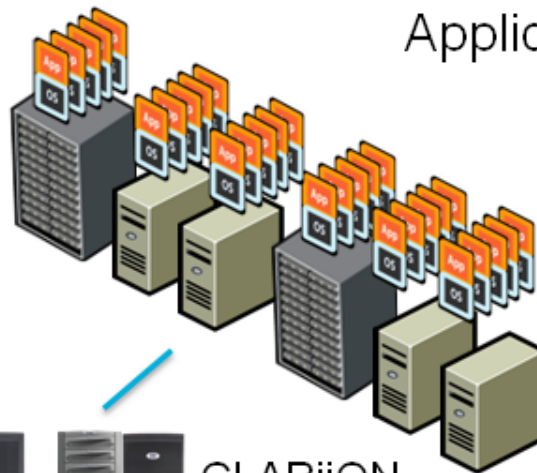
Tier 1
Applications



CLARiiON
Symmetrix
Celerra



Tier 2+
Applications



CLARiiON
Symmetrix
Celerra



Virtualization is the First Step on the Journey to the Private Cloud

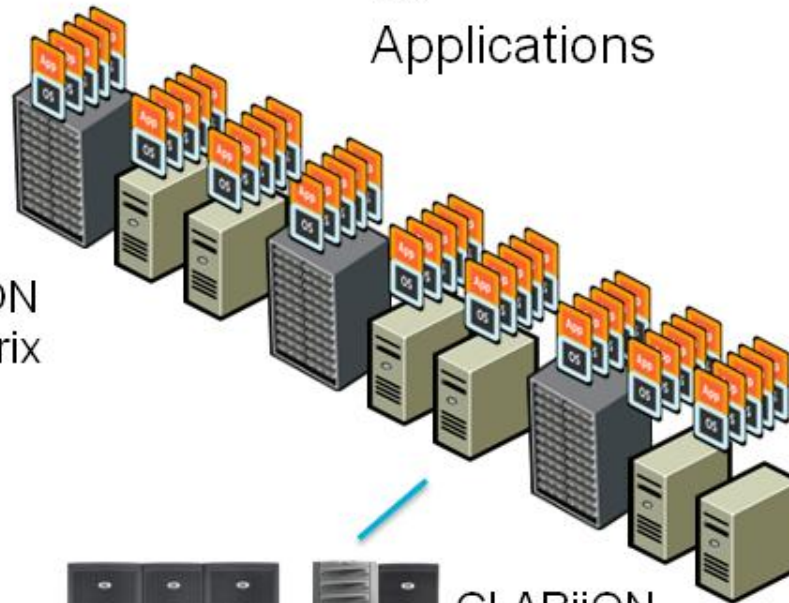


Reference Architectures, Proven Solutions and EMC Consulting

All Applications



CLARiiON Symmetrix Celerra



CLARiiON Symmetrix Celerra

Virtualization is the First Step on the Journey to the Private Cloud



Start with Applications or Infrastructure

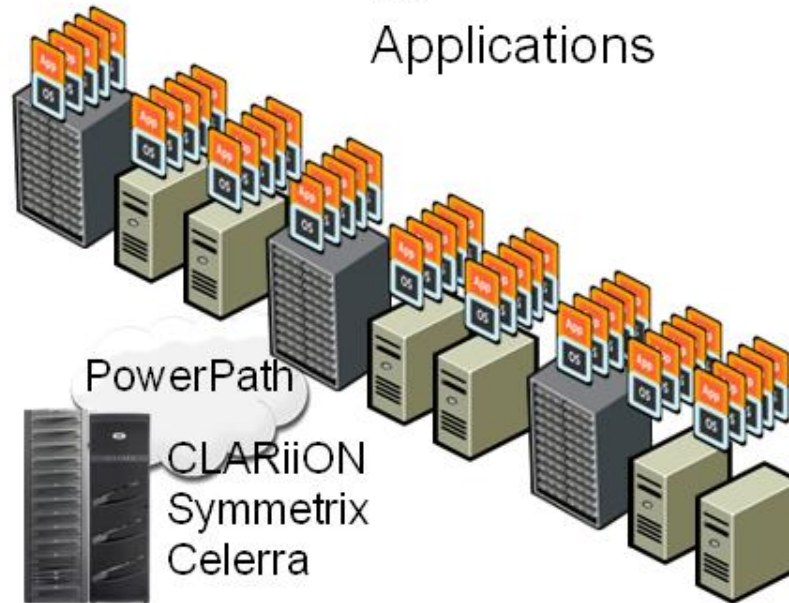


Reference Architectures, Proven Solutions and EMC Consulting

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All Applications



Additional Steps on The Path to Private Cloud and the V.C.E. Collaboration



Management for the Virtual Data Center

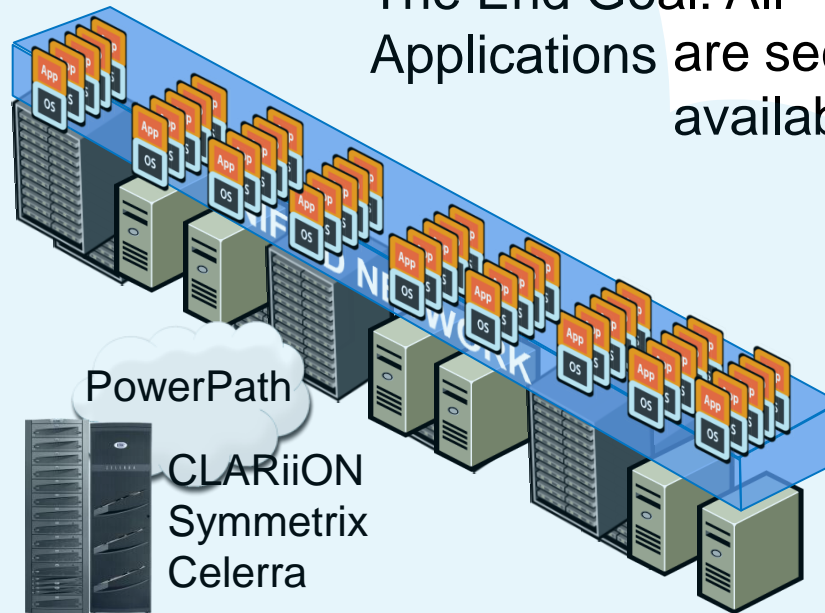
Backup for the Virtual Data Center

Business continuity and high availability for the virtual data center

Security for the Virtual Data Center

Today's Focus!

The End Goal: All Applications are secure, protected, available, and automated



PowerPath

CLARiiON
Symmetrix
Celerra



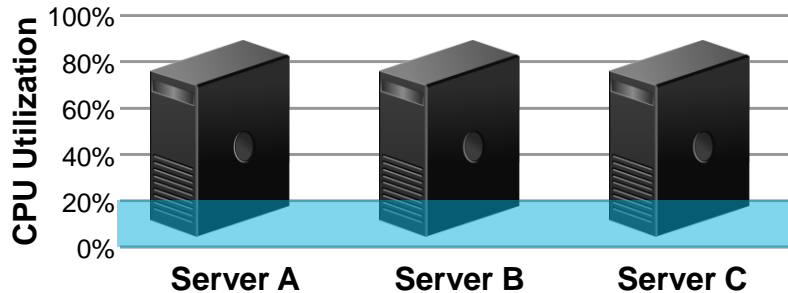
However....Backup for the Virtual Data Center Does present Challenges



Little Idle CPU, Memory Bandwidth, and I/O Capacity for Backup Can Slow Consolidation Efforts

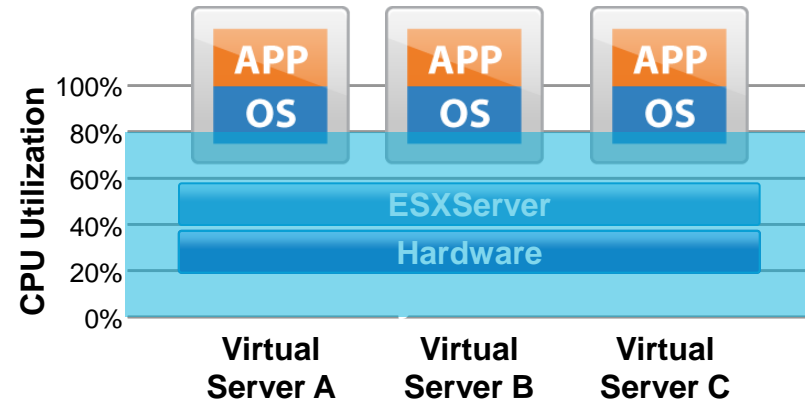
20 percent resource utilization

Physical



80 percent resource utilization

Virtual



Deduplication Can Help !

Retain. Replicate. Recover.

Dedupe everything without changing anything

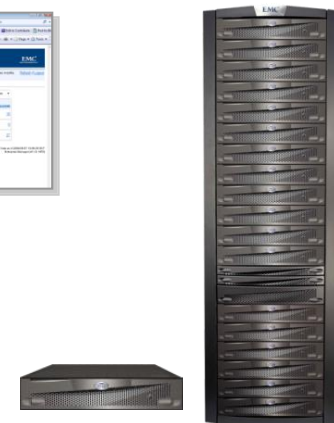
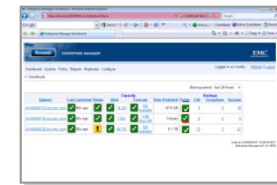
Simplify backup, archiving and DR with easy integration across workloads, infrastructures, and backup software



Data Domain (Target)
Deduplication Storage Systems

Never backup the same data twice

Revolutionize your backup by moving less data to solve your toughest VMware, NAS, and remote office backup challenges

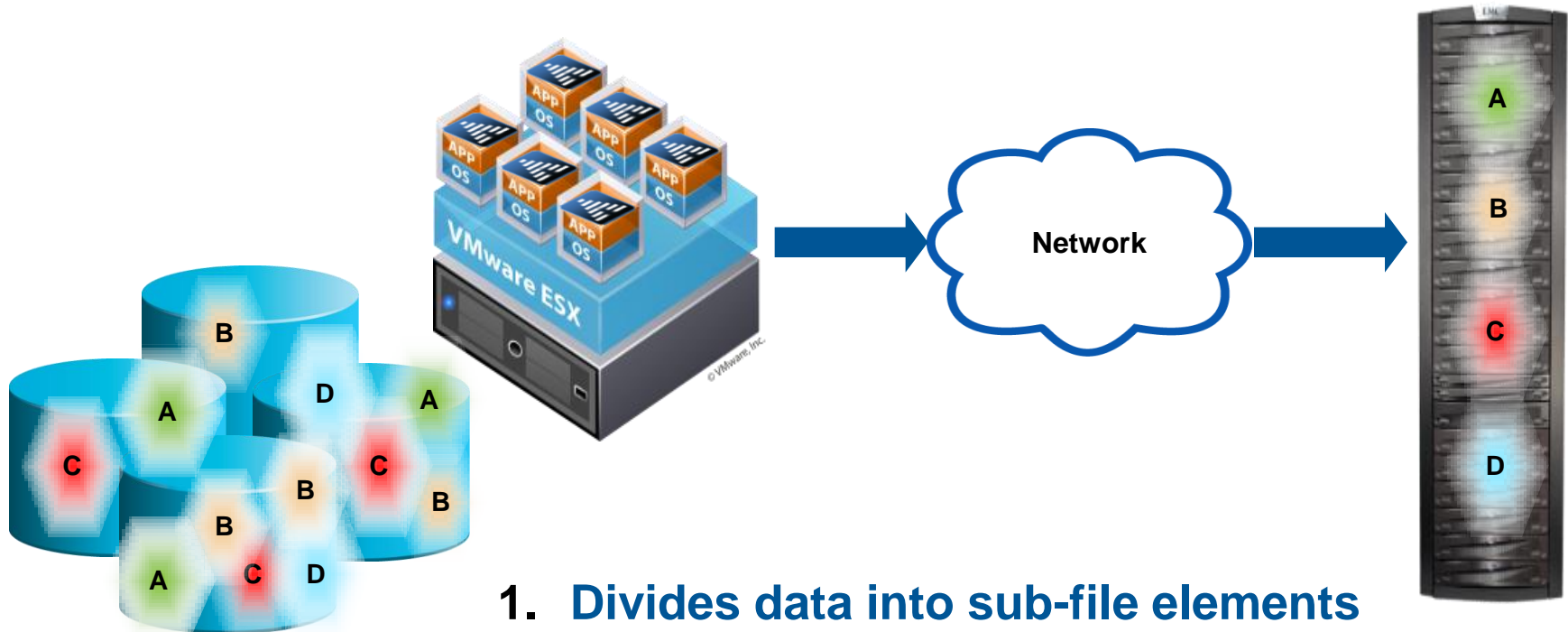


Avamar (Source)
Deduplication Backup Software

Avamar Moves Less Data

Optimized Backup for Virtualized Infrastructure

EMC²
where information lives[®]



1. Divides data into sub-file elements
2. Determines if elements are unique or duplicate
3. Backs up only data that is unique
4. Data sent is compressed and encrypted

Avamar Real World Results

Avamar daily full backups vs. traditional daily full backups



Data Type	Amount of Primary Data <u>Protected</u>	Amount of Data <u>Moved</u> Daily
Windows file systems	3,573 GB	6 GB
Mix of Windows, Linux, and UNIX file systems	5,097 GB	11 GB
Engineering files on NAS (NDMP backups)	3,265 GB	24 GB
Mix of 20 percent databases, 80 percent file systems (Windows and UNIX)	9,583 GB	80 GB
Mix of Linux file systems and databases	7,831 GB	104 GB


Source: EMC

While results will vary by data type and mix, Avamar can dramatically improve backup performance and efficiency

Avamar Products for VMware Infrastructure

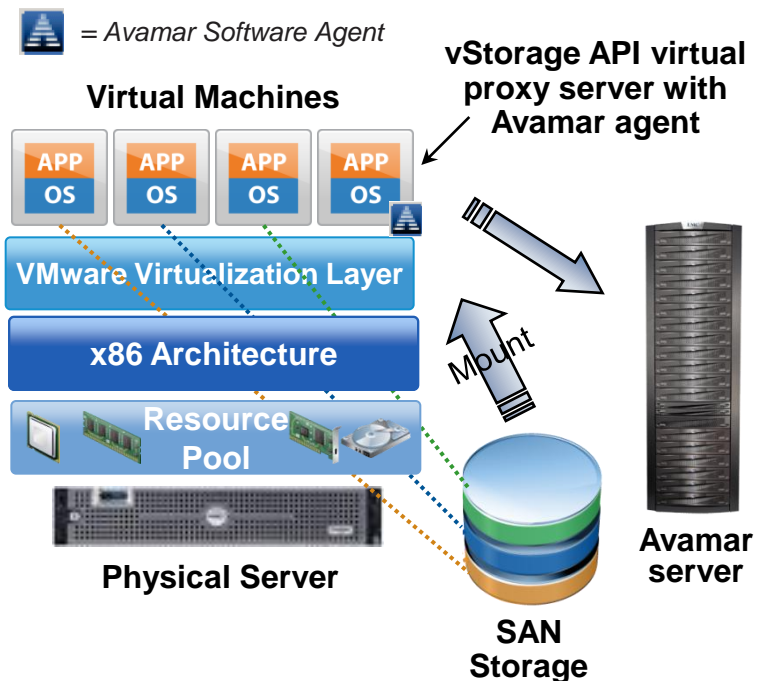
VMware Guest OS Backup



 = Avamar Software Agent

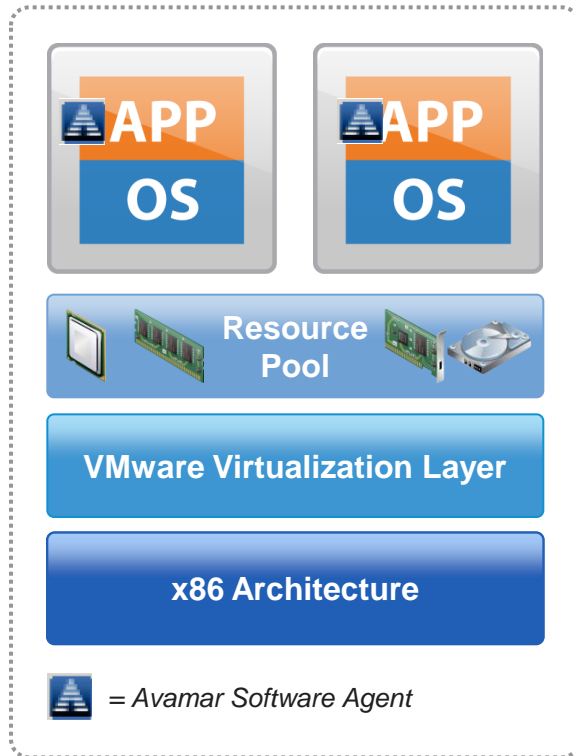
Avamar client software runs directly on each virtual machine

vStorage APIs for Data Protection



Avamar client software runs on the virtual proxy server

Avamar Backup for VMware Guest



- Avamar agent resides inside each virtual machine
 - Application specific plug-in
 - Capacity-based licensing – no charge for clients or plug-ins
- Provides system-state backups
- Deduplicates data within the virtual machine, as if they were physical servers
- Moves minimal backup data
 - Reduces resource contention and accelerates backups
- Provides file-level restore for Windows, Linux, and Solaris

Virtual Server Backup Challenges ...and the Avamar Answer

**Traditional backup
moves ~200% weekly**



VMware Virtualization Layer

x86 Architecture



Bottleneck!

- ✗ Backup window challenges
- ✗ Limits server consolidation

**Avamar
moves ~2% weekly**



VMware Virtualization Layer

x86 Architecture



**Dedupe
within the
VM
eliminates
bottleneck**

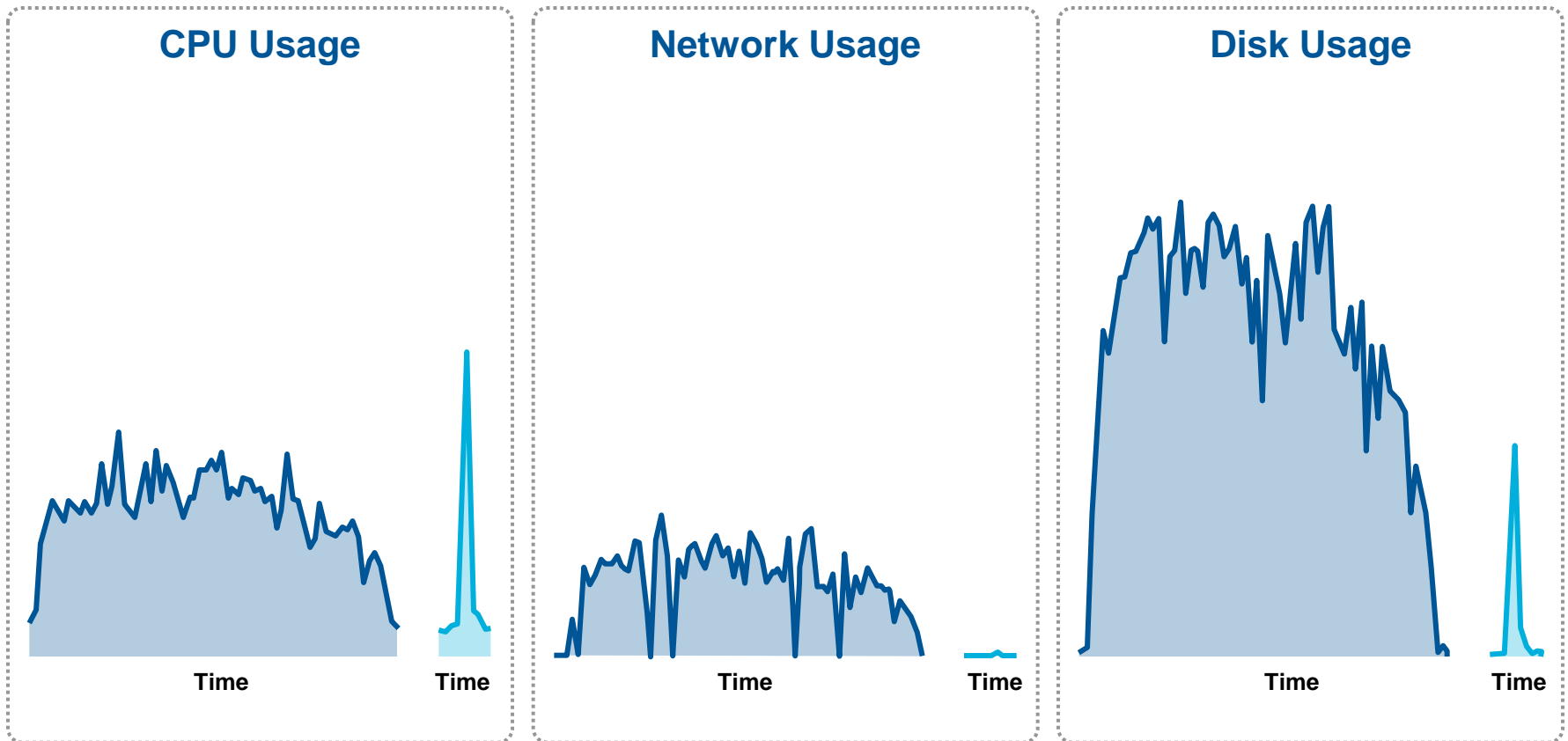
- ✓ Up to 95% less data moved
- ✓ Up to 90% faster backups
- ✓ **Up to 50% more server consolidation**

Avamar Impact

VMware Guest Server Backup



■ Traditional Backup v ■ Avamar Guest Backup

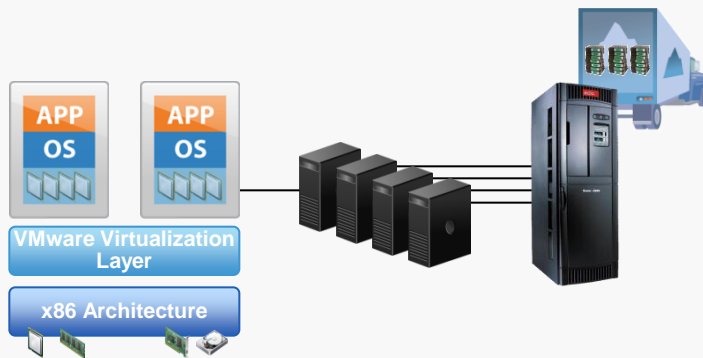


Avamar for VMware Customer Example

Customer reduced VMware Backup cost by 50%

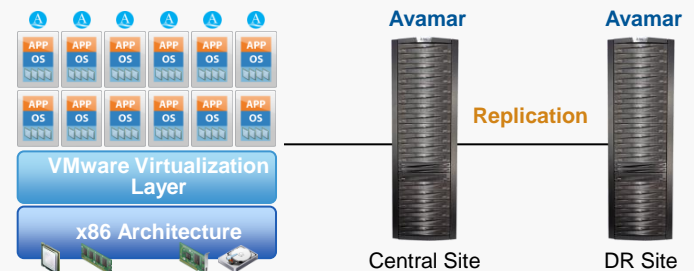


Traditional Backup for VMware



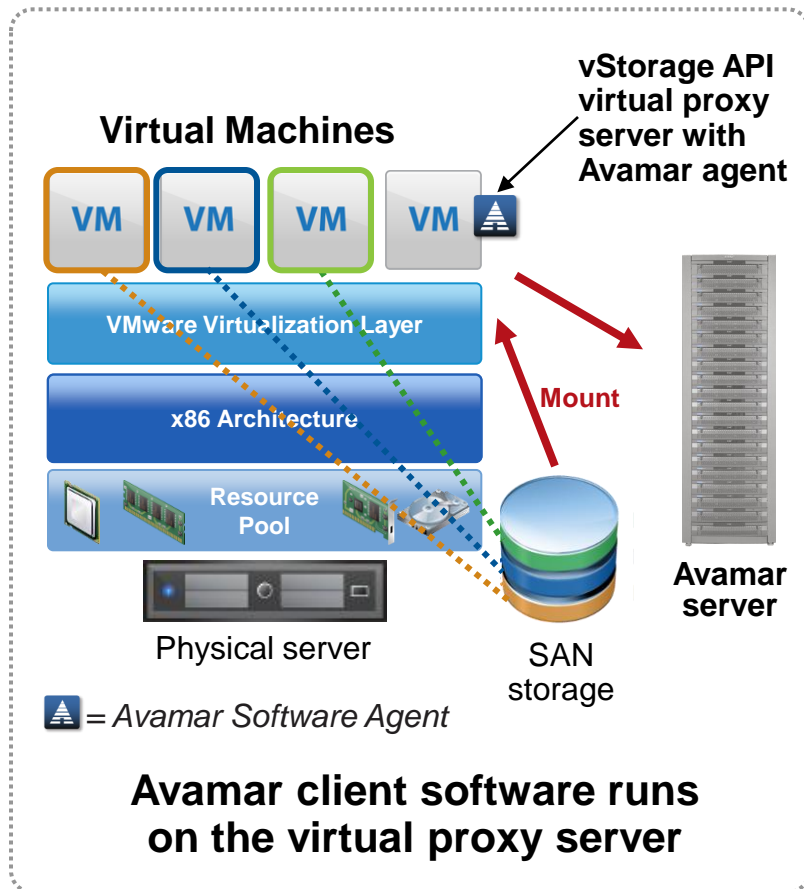
- ✗ Long backup windows that limit consolidation
- ✗ Multiple restore steps
- ✗ High FTE costs for NetBackup administration

Avamar Answer



- 2009 save of \$2,900,000; less than 24 month payback
- 2X increase in ESX hardware efficiency
- 80% reduction in backup window
- Point-and-click restore from disk in minutes
- Eliminated offsite tape storage (& costs) with replication for DR

Avamar Image-Level Backups via vStorage APIs



- Avamar agent resides on the virtual proxy server
- Fast, daily full backups
- Deduplicates within and across VMDK files
- Supports both file-level (Windows only) and image-level recovery
- Avamar replication provides disaster recovery for VMDKs
- vSphere4 enabled capabilities
 - SCSI Hot Add
 - Change block support for VMDK image
 - Restore full VM as a new VM

Leveraging vStorage API/Change-Block for VMDK Image Backups



Session								
Status	Error	Start Time	Elapsed	End Time	Type	Progress	New	Client
		(EST)		(EST)		Bytes	Bytes	
✓ Completed		2009-11-10 21:47	00h:00m:56s	2009-11-10 21:48	On-Demand Backup	60.0 GB	<0.05%	AVAMAR079
✓ Completed		2009-11-10 21:47	00h:00m:56s	2009-11-10 21:48	On-Demand Backup	60.0 GB	<0.05%	AVAMAR028
✓ Completed		2009-11-10 21:48	00h:01m:04s	2009-11-10 21:49	On-Demand Backup	60.0 GB	<0.05%	AVAMAR041
✓ Completed		2009-11-10 22:13	00h:01m:10s	2009-11-10 22:14	On-Demand Backup	100.0 GB	<0.05%	AVAMARX136
✓ Completed		2009-11-10 21:45	00h:01m:15s	2009-11-10 21:46	On-Demand Backup	8.0 GB	0.1%	AVAMARX060
✓ Completed		2009-11-10 21:45	00h:01m:15s	2009-11-10 21:46	On-Demand Backup	8.0 GB	0.1%	AVAMARX062
✓ Completed		2009-11-10 21:43	00h:01m:59s	2009-11-10 21:45	On-Demand Backup	8.0 GB	0.1%	AVAMARX063
✓ Completed		2009-11-10 21:43	00h:01m:59s	2009-11-10 21:45	On-Demand Backup	8.0 GB	0.2%	AVAMARX061
✓ Completed		2009-11-10 21:43	00h:01m:59s	2009-11-10 21:45	On-Demand Backup	8.0 GB	0.2%	AVAMARX064
✓ Completed		2009-11-10 21:43	00h:25m:42s	2009-11-10 22:08	On-Demand Backup	20.0 GB	<0.05%	MACHINE5
✓ Completed		2009-11-10 22:09	00h:25m:58s	2009-11-10 22:35	On-Demand Backup	40.0 GB	0.2%	AVAMAR253
✓ Completed		2009-11-10 22:35	00h:26m:15s	2009-11-10 23:01	On-Demand Backup	40.0 GB	0.1%	AVAMAR243
✓ Completed		2009-11-10 21:43	00h:29m:52s	2009-11-10 22:13	On-Demand Backup	40.0 GB	0.5%	AVAMAR252
✓ Completed		2009-11-10 22:15	00h:36m:08s	2009-11-10 22:51	On-Demand Backup	20.0 GB	0.1%	AVAMAR101
✓ Completed		2009-11-10 21:47	01h:13m:45s	2009-11-10 23:00	On-Demand Backup	250.0 GB	<0.05%	MACHINE11

Without Change-Block

Avamar for VMware – Verifying VM Protection

Protection tabs lists VMs in vCenter & protection status



avamar120.Iss.emc.com Avamar Administrator - Administration (/)

Actions Tools Navigation Help

Account Management Event Management Services Administration

Users Protection

Number of virtual machines: 83

Virtual Machine	Protected	Location	Server	Account
AVAMARX060	Image	117 Lab/vm/ATMO...	avamar194.Iss.e...	/avamar203.Iss.e...
AVAMARX056	No	117 Lab/vm/Field ...	avamar194.Iss.e...	
AVAMARX049	Guest	117 Lab/vm/Field ...	avamar195.Iss.e...	/Homebase/avam...
AVAMARX048	Guest	117 Lab/vm/Field ...	avamar195.Iss.e...	/Homebase/avam...
AVAMARX047	Guest	117 Lab/vm/Field ...	avamar194.Iss.e...	/Homebase/avam...
AVAMARX046	Guest	117 Lab/vm/Field ...	avamar193.Iss.e...	/Homebase/avam...
AVAMARX045	No	117 Lab/vm/Field ...	avamar193.Iss.e...	
AVAMARX042	Guest	117 Lab/vm/Field ...	avamar193.Iss.e...	/Homebase/avam...
AVAMAR254	Image	117 Lab/vm/Infrast...	avamar195.Iss.e...	/avamar203.Iss.e...
AVAMAR253	Image	117 Lab/vm/Infrast...	avamar195.Iss.e...	/avamar203.Iss.e...
AVAMAR252	Image	117 Lab/vm/Infrast...	avamar193.Iss.e...	/avamar203.Iss.e...
AVAMAR247	Guest/Image	117 Lab/vm/Infrast...	avamar194.Iss.e...	/Infrastructure/DTL...
AVAMAR246	Image	117 Lab/vm/Infrast...	avamar195.Iss.e...	/avamar203.Iss.e...
AVAMAR244	Image	117 Lab/vm/Infrast...	avamar194.Iss.e...	/avamar203.Iss.e...
AVAMAR243	Image	117 Lab/vm/Disco...	avamar194.Iss.e...	/avamar203.Iss.e...
AVAMAR242	Image	117 Lab/vm/Infrast...	avamar194.Iss.e...	/avamar203.Iss.e...
AVAMAR235	Image	117 Lab/vm/Disco...	avamar195.Iss.e...	/avamar203.Iss.e...
AVAMAR113	No	117 Demo/vm/Dis...	avamar196.Iss.e...	
AVAMAR101	Image	117 Lab/vm/DPA ...	avamar193.Iss.e...	/avamar203.Iss.e...
AVAMAR100	Guest/Image	117 Lab/vm/Infrast...	avamar193.Iss.e...	/Infrastructure/DTL...
AVAMAR099	Image	117 Lab/vm/DPA ...	avamar193.Iss.e...	/avamar203.Iss.e...
AVAMAR095	Guest*	117 Lab/vm/Infrast...	avamar194.Iss.e...	/Infrastructure/VM_...

Sch/Disp: Running/Running Have Unacknowledged Events Server: Full Access

Avamar Server Deployment Options



Avamar Software



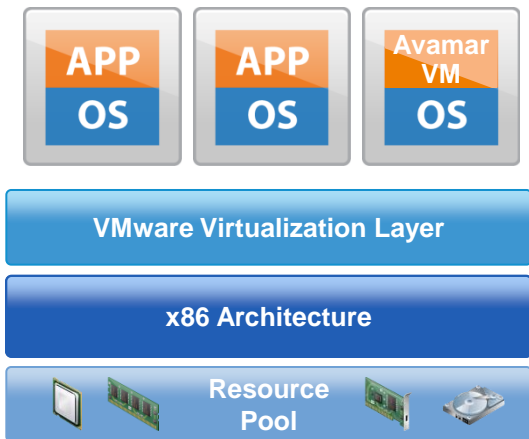
Deployed on qualified, industry-standard servers

Avamar Data Store Appliance



Fully integrated hardware/software product with single point of support

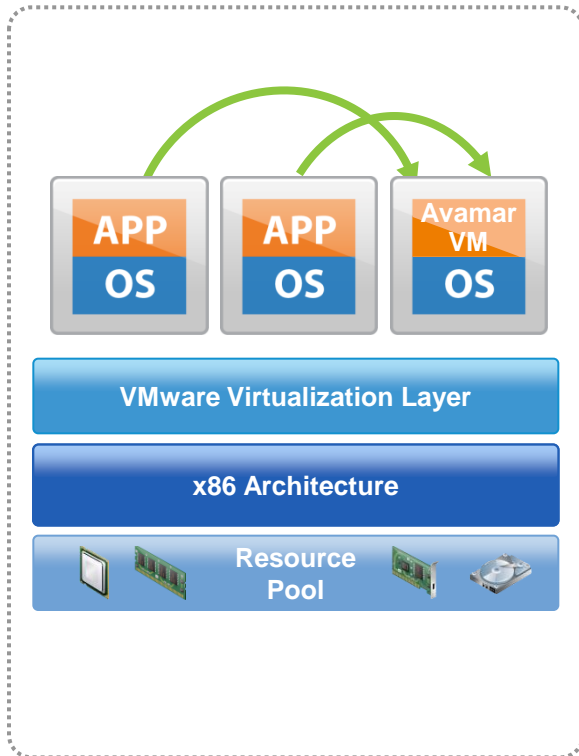
Avamar Virtual Edition for VMware



Single-node Avamar server running as a virtual machine

Avamar Virtual Edition (AVE) for VMware

Avamar server software deployed as a virtual appliance

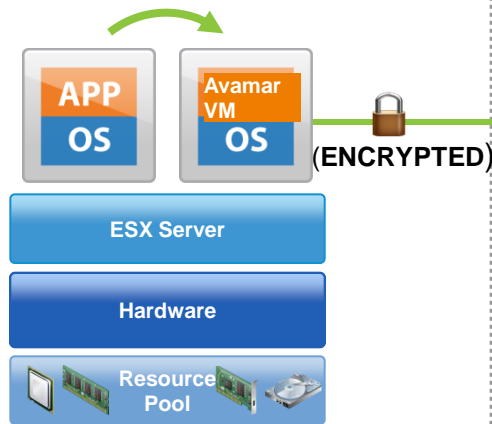


- Industry's first deduplication virtual appliance for backup, recovery, and disaster recovery
- Leverages existing servers and storage
 - Can utilize existing iSCSI, SAN or DAS disk storage
- Replication (of applications and storage) eliminates shipping tapes
 - Replicate between virtual Avamar servers and physical Avamar servers
- Facilitates rapid, cost-effective deployment and return on investment
- Supports VMotion for deployment flexibility
- Up to two Avamar Virtual Edition virtual appliances per ESX server for scalability

Avamar Solutions for VMware

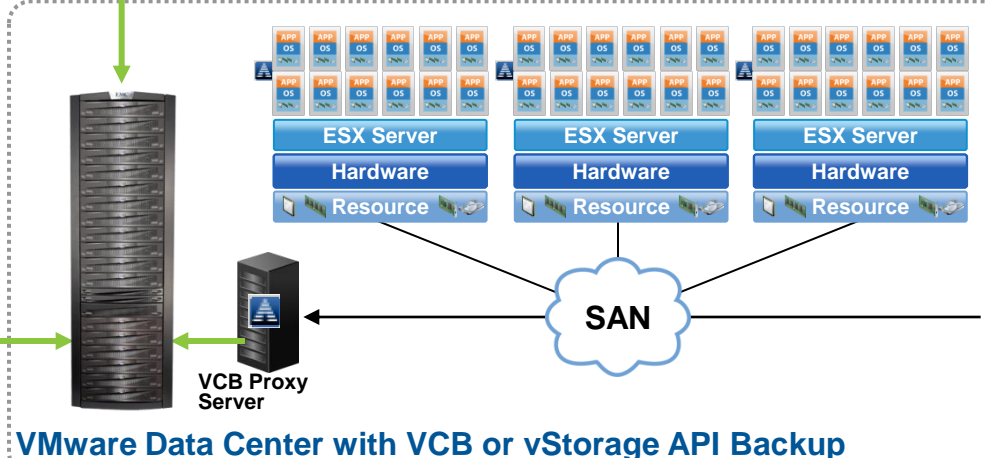
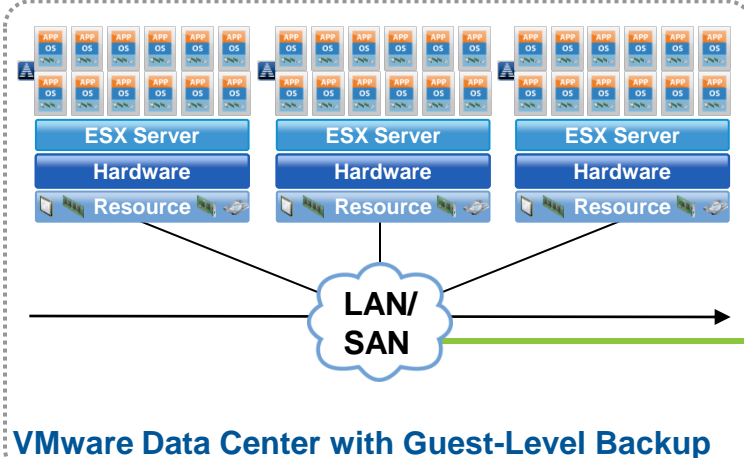
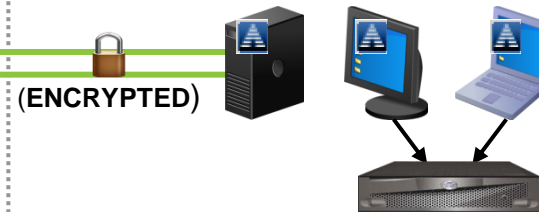
Remote Offices with VMware

Avamar agent moves data to Avamar Virtual Edition for VMware; data is then replicated to the corporate data center



Remote Offices without VMware

Avamar agent moves data to a physical Avamar Single Node server; data is then replicated to the corporate data center, **OR** an Avamar agent can back up directly to the data center over the WAN



US-based Retailer Example

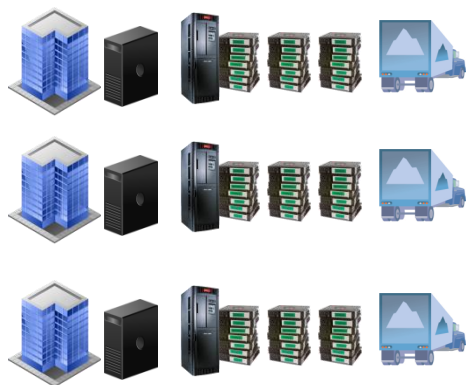
EMC Backup Deduplication Customer Success



BEFORE

2,300 locations with tape

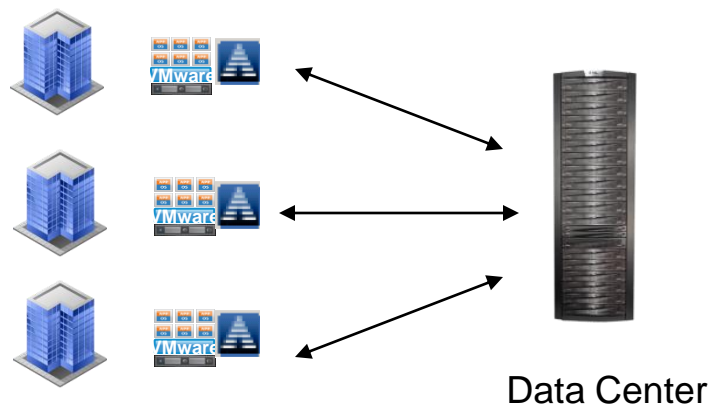
- ✗ No verification backups taking place
- ✗ Risk of tape handling/transport
- ✗ Cost per location
- ✗ Each store upgrading to VMware



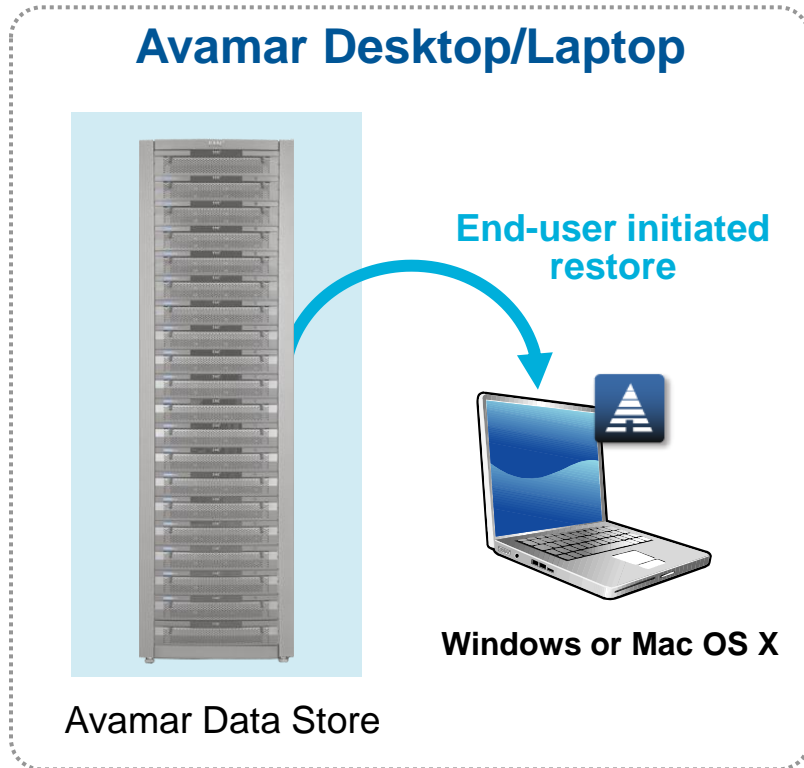
AFTER

- ✓ All 2,300 stores protected with Avamar
- ✓ Deployed as virtual appliance, protecting VMware
- ✓ Verifiable local daily backups & replication
- ✓ **\$15,000,000 in savings over 5 years**

2,300 sites with VMware backed up locally and replicated daily by Avamar

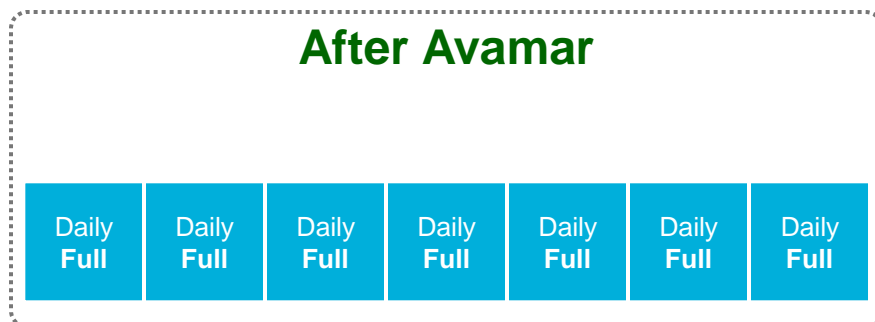
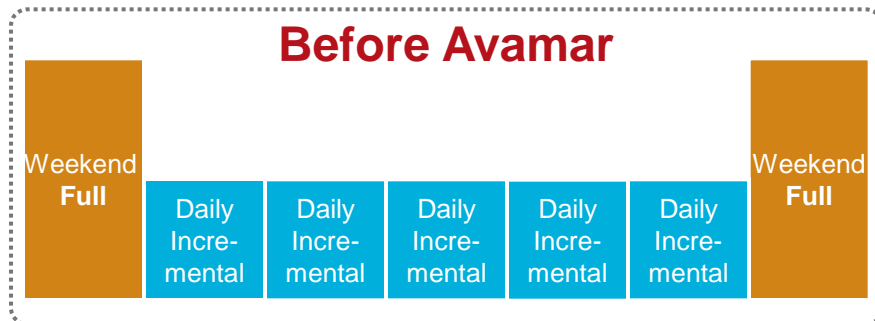


Desktop/Laptop Backup Challenges and Avamar Solution



- Puts power in end-users hands
 - Eliminates Help Desk for restoring data to desktop or laptop
 - End-users restore their data anytime, anywhere
 - Self-managed restores
 - Document-level search engine
- All the benefits of Avamar backup
 - Data deduplicated at the source
 - Daily full backups—up to 10 times faster
 - Minimal impact on PC and network resources during backup

Real Avamar for NAS Success Stories



Customer Example 1

With NetBackup: NDMP backups **taking 60 hours** to do a full of 2.9TB with 20 million files.

With Avamar: their daily backups are now **only 13 hours** and they never have to do a full NDMP backup again! And now they have single step restores

Customer Example 2

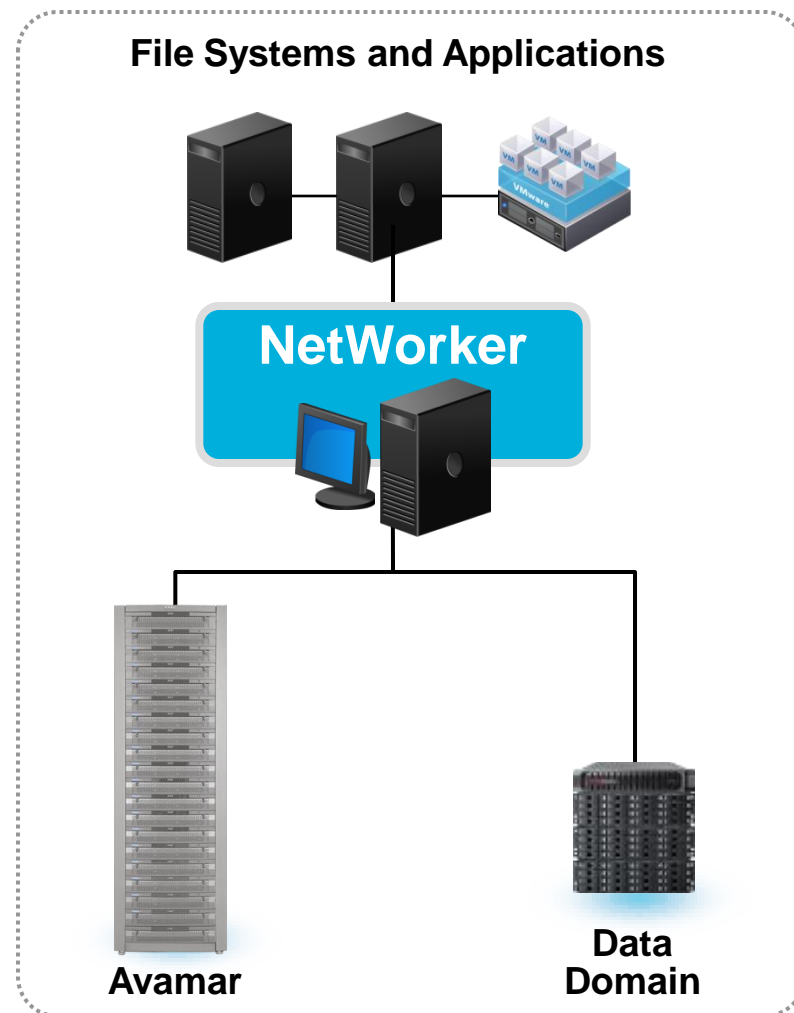
With NetBackup: NDMP backups by NetBackup **taking 39 hours** to do a full of 1.7TB with 9.8 million files.

With Avamar: their daily backups are now **only 2 hours** and they never have to do a full NDMP backup again! And now they have single step restores

EMC NetWorker Integration w Avamar & Data Domain



- Comprehensive data protection bridging deduplication and traditional backup
 - Common workflow
 - Centralized management
- Integration with Avamar
 - Single client
 - One user interface
- Integration with Data Domain
 - Fully qualified interoperability
 - Easy deployment
- Support of applications, replication and tape
 - Integrated application support – Microsoft, Oracle, SAP, VMware
 - Continuous Data Protection and Remote Replication
 - Snapshot management
 - Tape and Media Management

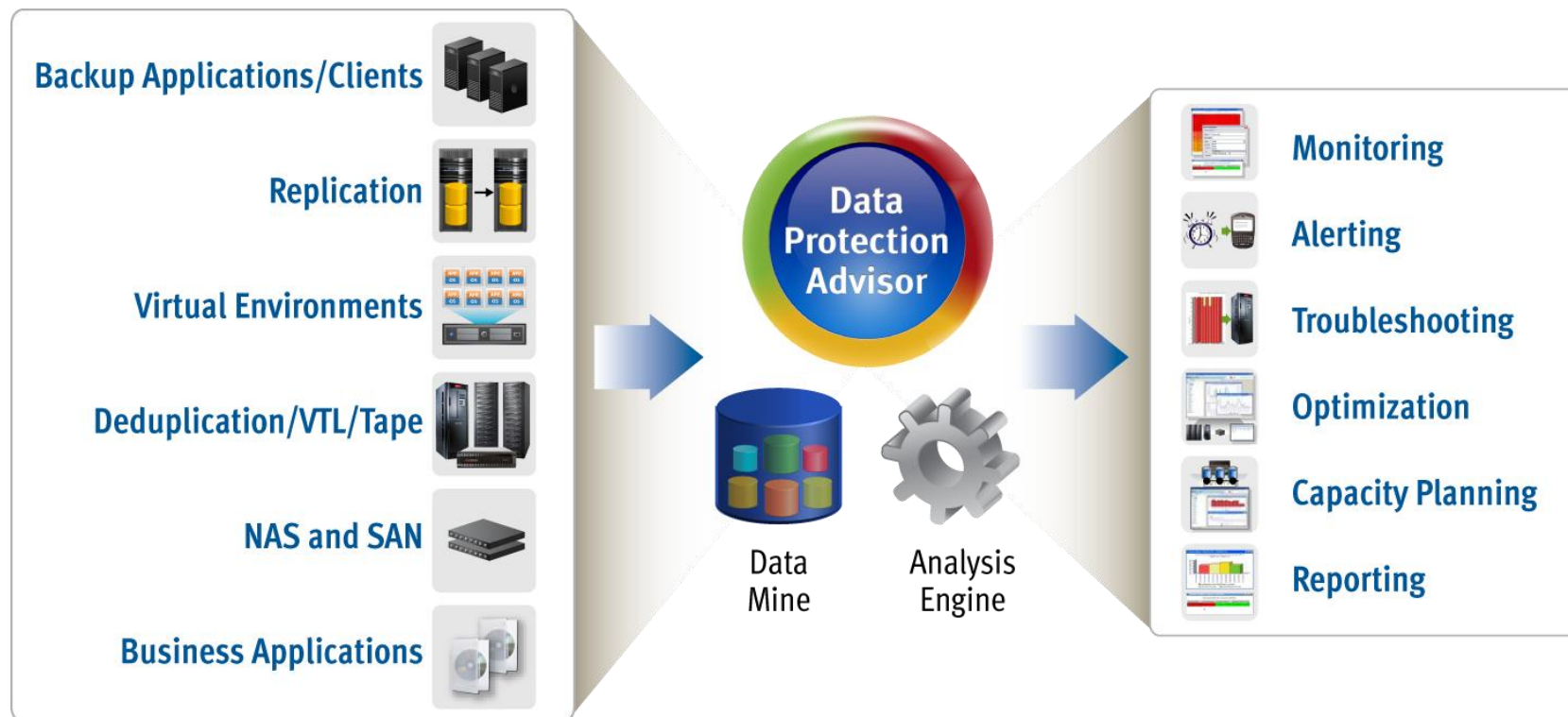


EMC Data Protection Advisor

Unified Data Protection Management Software



Always know you can recover – and prove it



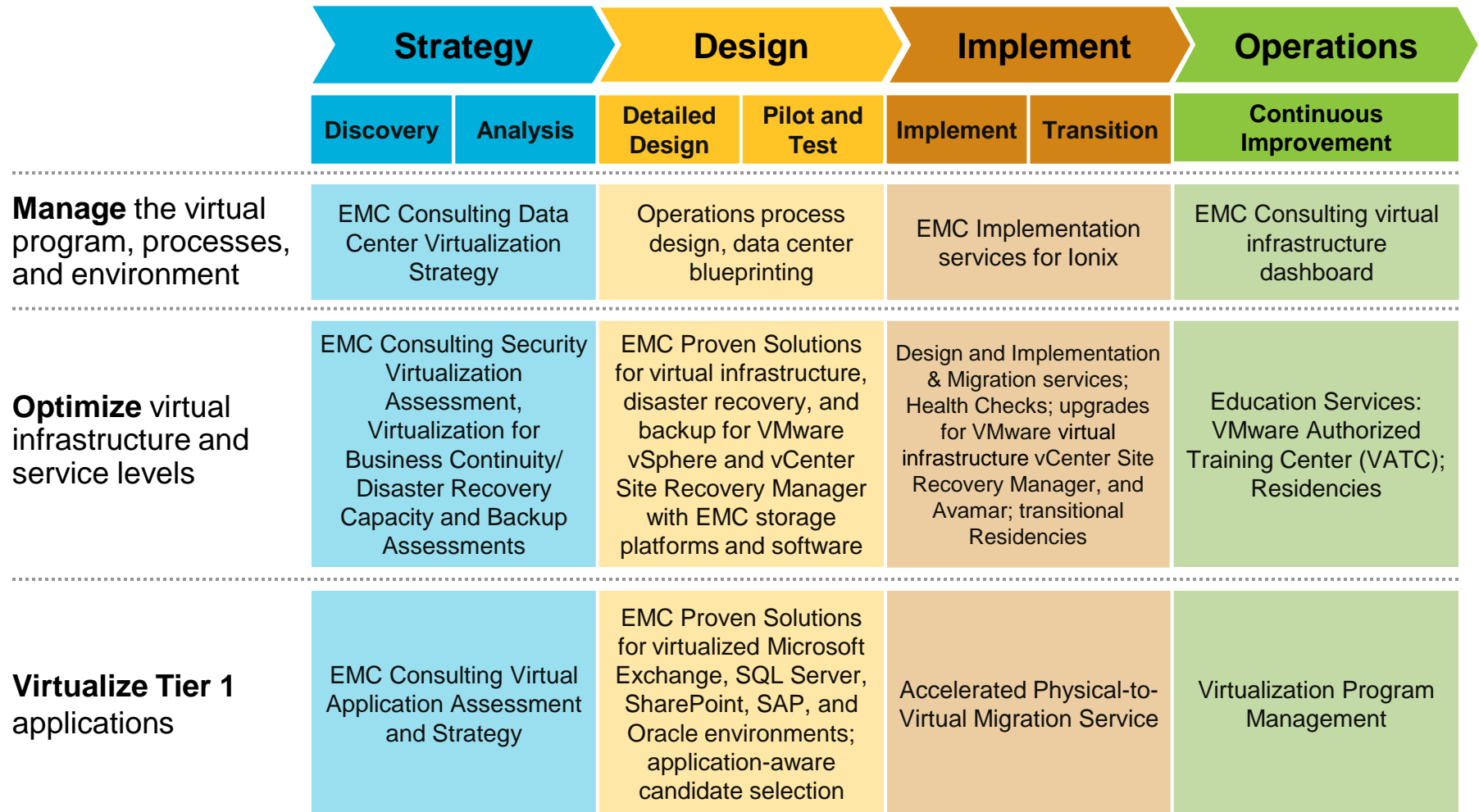
Payback typical in 12 months or less

Lowers risk—manage to service level agreements

Reduces costs—insight drives efficiency

Minimizes complexity—single, integrated view

EMC has a Wide Range of Services to help you Accelerate your Virtualization



Why EMC for VMware Data Protection



- Proven, leading-edge technology for VMware infrastructure
 - Industry Leading deduplication solutions provides answers for VMware backup
- Choices—next generation backup, traditional or both combined
- Full suite of backup services, solutions, and software
 - Comprehensive technology and delivery partnerships
- Flexible business partner
 - Simplifies management overhead by being prime contractor
 - Entire lifecycle deployment, or point engagements



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where information lives[®]