Adaptive COMPUTING HyTrust Virtualization Under Control TREND MICRO

ISACA®
Trust in, and value from, information systems
San Francisco Chapter

S24 – Virtualization Security from the Auditor Perspective

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November 7-9, 2011

Back to Business

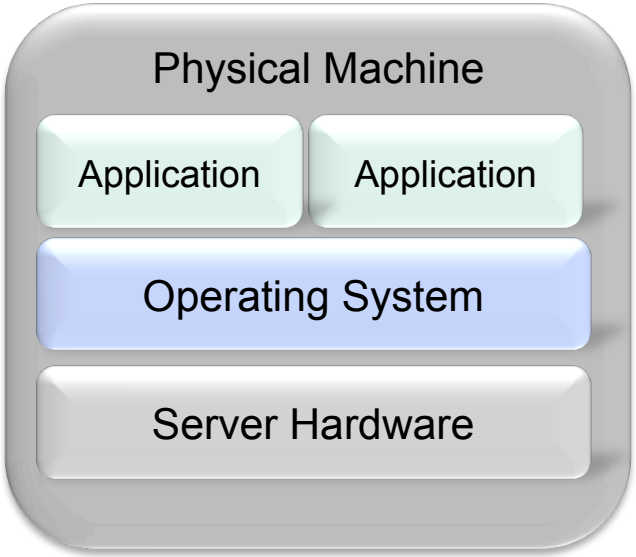
Agenda

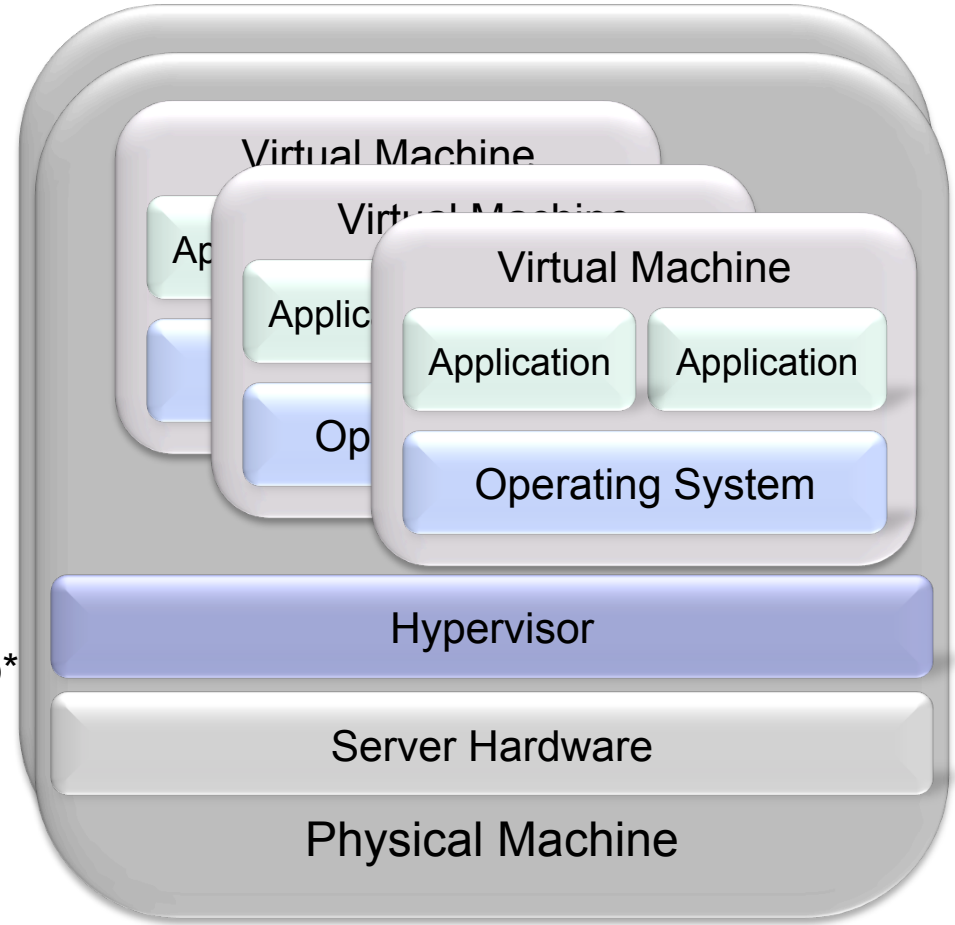
- Virtualization Overview & Security Challenges
- Industry Best Practices
  - ISACA/CObIT Virtualization Security Checklist
  - Center for Internet Security (hardening best practices)
  - Payment Card Industry (Data Security Standard & Virtualization Information Supplement)
  - NIST Virtualization Guidance
- End-to-End Security and Compliance Guidance
- Q & A
- Resources

Agenda

- Virtualization Overview & Security Challenges

What is Virtualization?



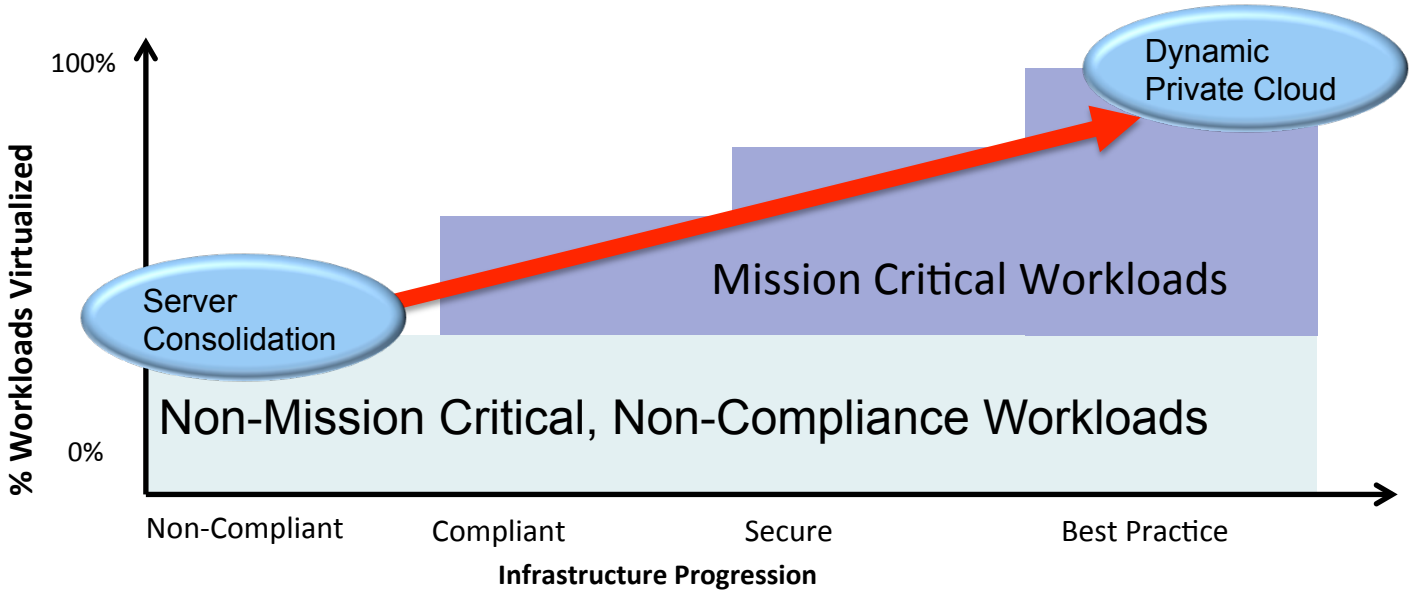


Virtualization is highly compelling:

- 60% reduction in capital expenditure per app*
- Half as many human resources require per app*
- 80% reduction in Datacenter outage costs*
- Key to implementation of cloud computing

* VMware Analysis 2010

Virtualization Progression

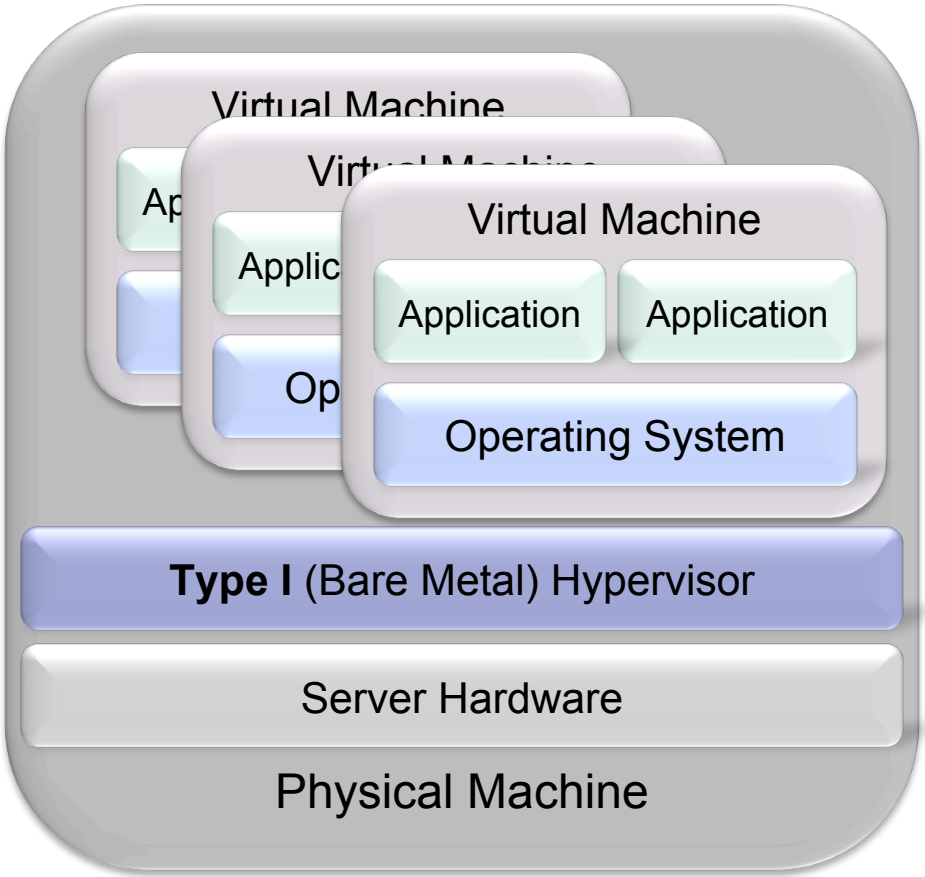


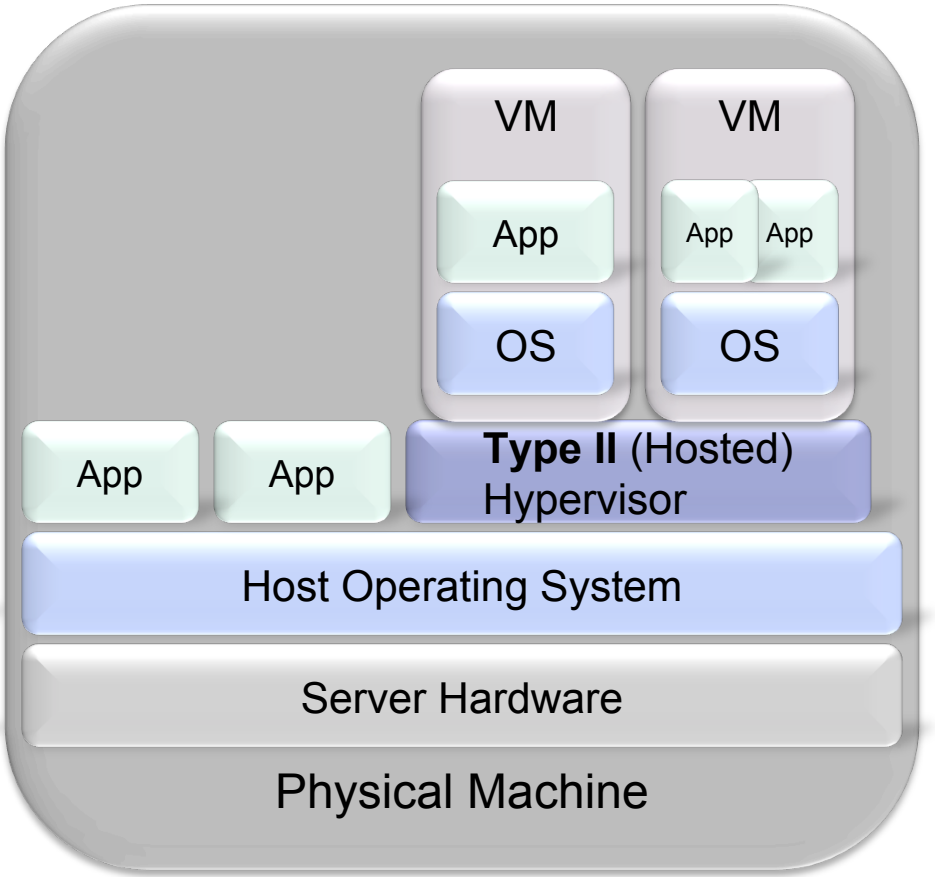
Despite high ROI, barriers to adoption remain

- 46% cite security as primary reason that adoption can be slowed*
- 35% worry about insider threats‡
- 28% "very" or "extremely" concerned with security in virtual environment‡‡

* Jeff Burt, eWeek Article, Sept. 2009
‡ Prism Microsystems Survey of 300 orgs, 2010
‡‡ Info Pro 2010 Security Study

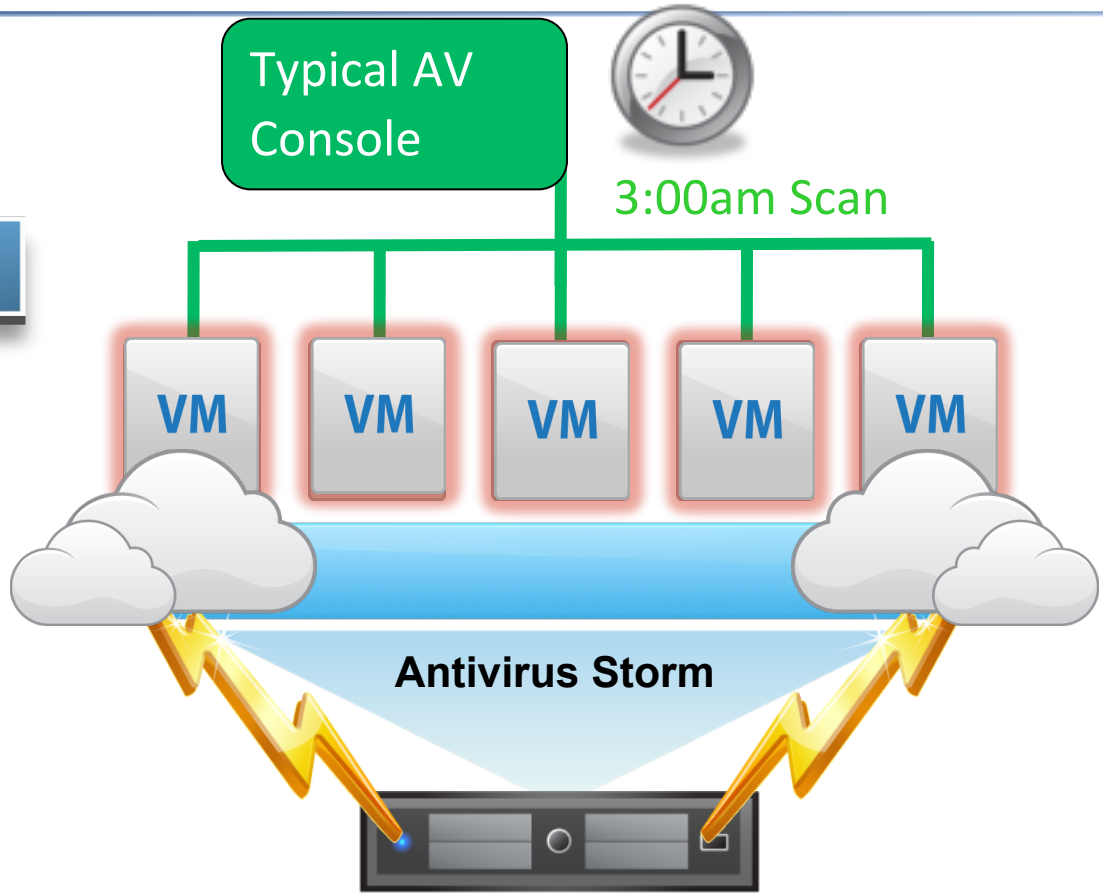
Challenge: Not All Hypervisors are Equal





Security Challenge: Resource Contention

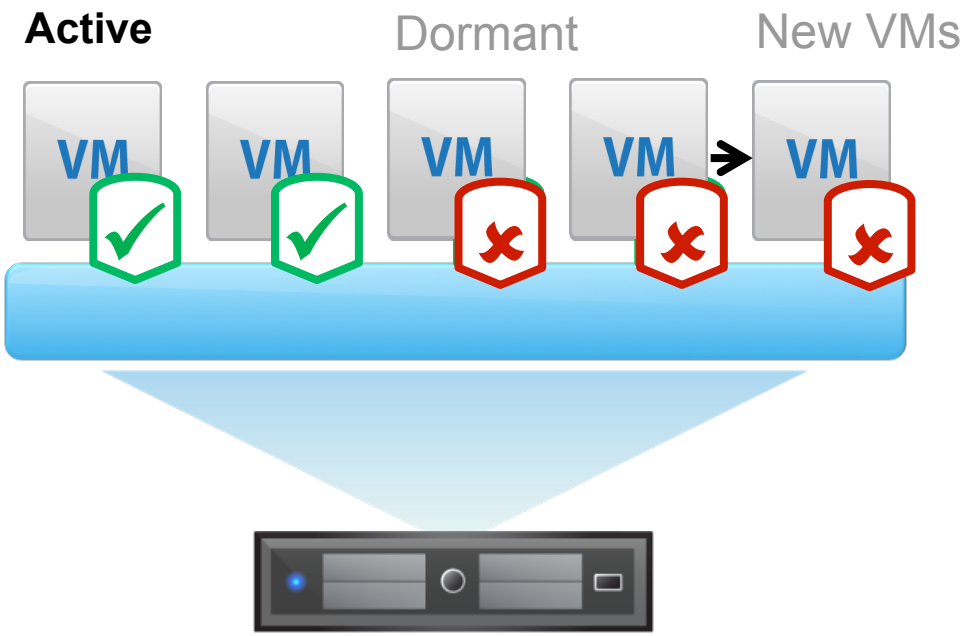
1. Resource Contention



Antivirus scans & updates overburden the Hypervisor & SAN

Security Challenge: Instant-on Gaps

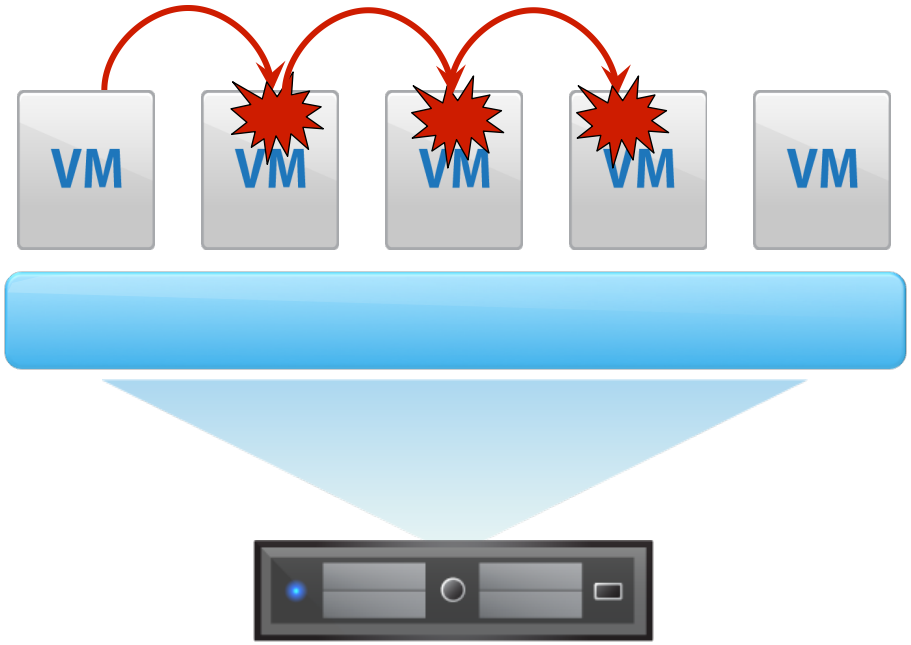
1. Resource Contention
2. Instant-on Gaps



Dormant VMs will be missing critical patches and contain out-of-date security controls and are subject to exploitation and compromise

Security Challenge: Inter-VM Attacks

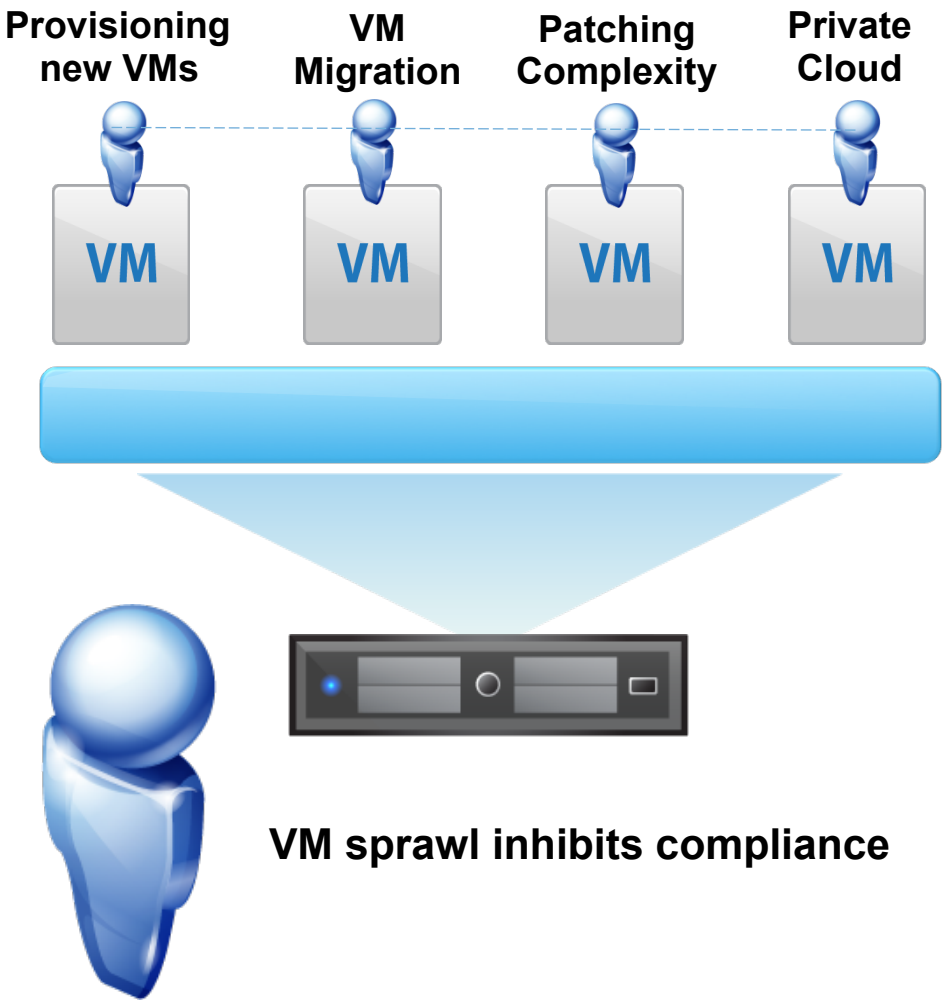
1. Resource Contention
2. Instant-on Gaps
3. Inter-VM Attacks / Blind Spots



Attacks can spread across VMs

Security Challenge: Management

1. Resource Contention
2. Instant-on Gaps
3. Inter-VM Attacks / Blind Spots
4. Complexity of Management



Agenda

- Industry Best Practices
  - ISACA/CObIT Virtualization Security Checklist
  - Center for Internet Security (hardening best practices)
  - Payment Card Industry (Data Security Standard & Virtualization Information Supplement)
  - NIST Virtualization Guidance

CObIT

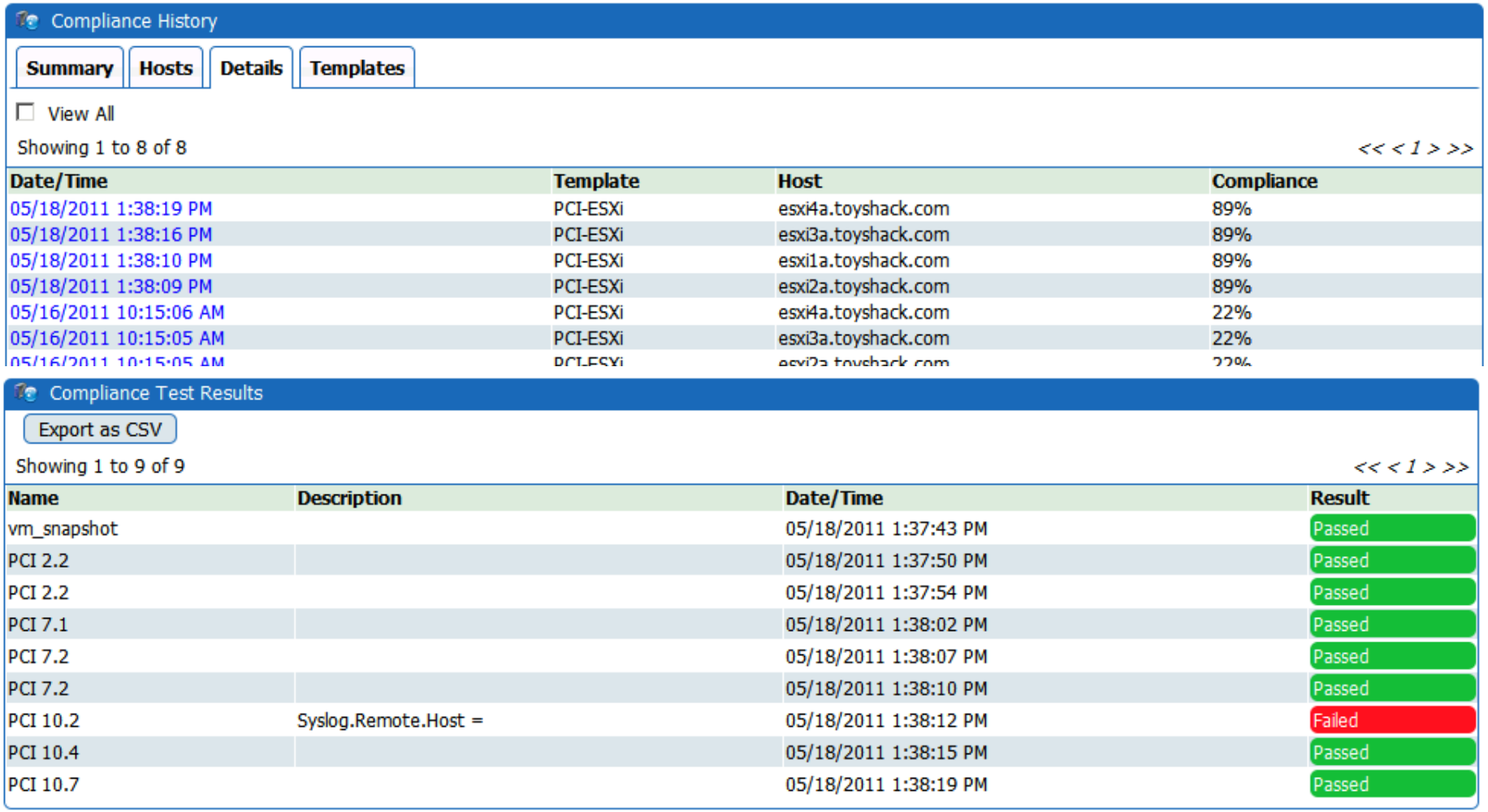
ISACA Checklist Mapping To	CObIT Control Objective(s)
1. Securing the virtualization platform a. Platform and installation requirements	
1.a.1 Limit physical access to the host: only authorized administrative personnel should have physical access to the host system to prevent unauthorized changes.	PO4.9, DS12.3
1.a.2 Verify integrity of files prior to installation: verify the hash values of system files, as provided by the vendor, prior to installation to ensure integrity.	PO2.4, AI3.2
1.a.3 Load and enable only required operating system components and services: no unnecessary operating systems components (e.g., drivers) should be loaded, and no unnecessary services should be enabled (e.g., printing services, file sharing services).	AI3.2
1.a.4 BIOS, bootloader passwords: passwords should be used for BIOS and bootloaders (e.g., GRUB) for both hosts and guests.	DS5.3

Source: ISACA Virtualization-Security-Checklist-26Oct2010-Research.pdf

Center for Internet Security (CIS)

- Working on VMware vSphere 4.1 benchmark, schedule dependent on volunteers
- vSphere 5 already released, no hardening guide from vendor or CIS or NSA or DISA stigs…
- Use vendor supplied benchmark: more current and vendor aligned with CIS and government requirements

Automate Configuration Compliance Reporting



Compliance History

Summary | Hosts | Details | Templates

View All

Showing 1 to 8 of 8 << < 1 > >>

Date/Time	Template	Host	Compliance
05/18/2011 1:38:19 PM	PCI-ESXi	esxi4a.toyshack.com	89%
05/18/2011 1:38:16 PM	PCI-ESXi	esxi3a.toyshack.com	89%
05/18/2011 1:38:10 PM	PCI-ESXi	esxi1a.toyshack.com	89%
05/18/2011 1:38:09 PM	PCI-ESXi	esxi2a.toyshack.com	89%
05/16/2011 10:15:06 AM	PCI-ESXi	esxi4a.toyshack.com	22%
05/16/2011 10:15:05 AM	PCI-ESXi	esxi3a.toyshack.com	22%

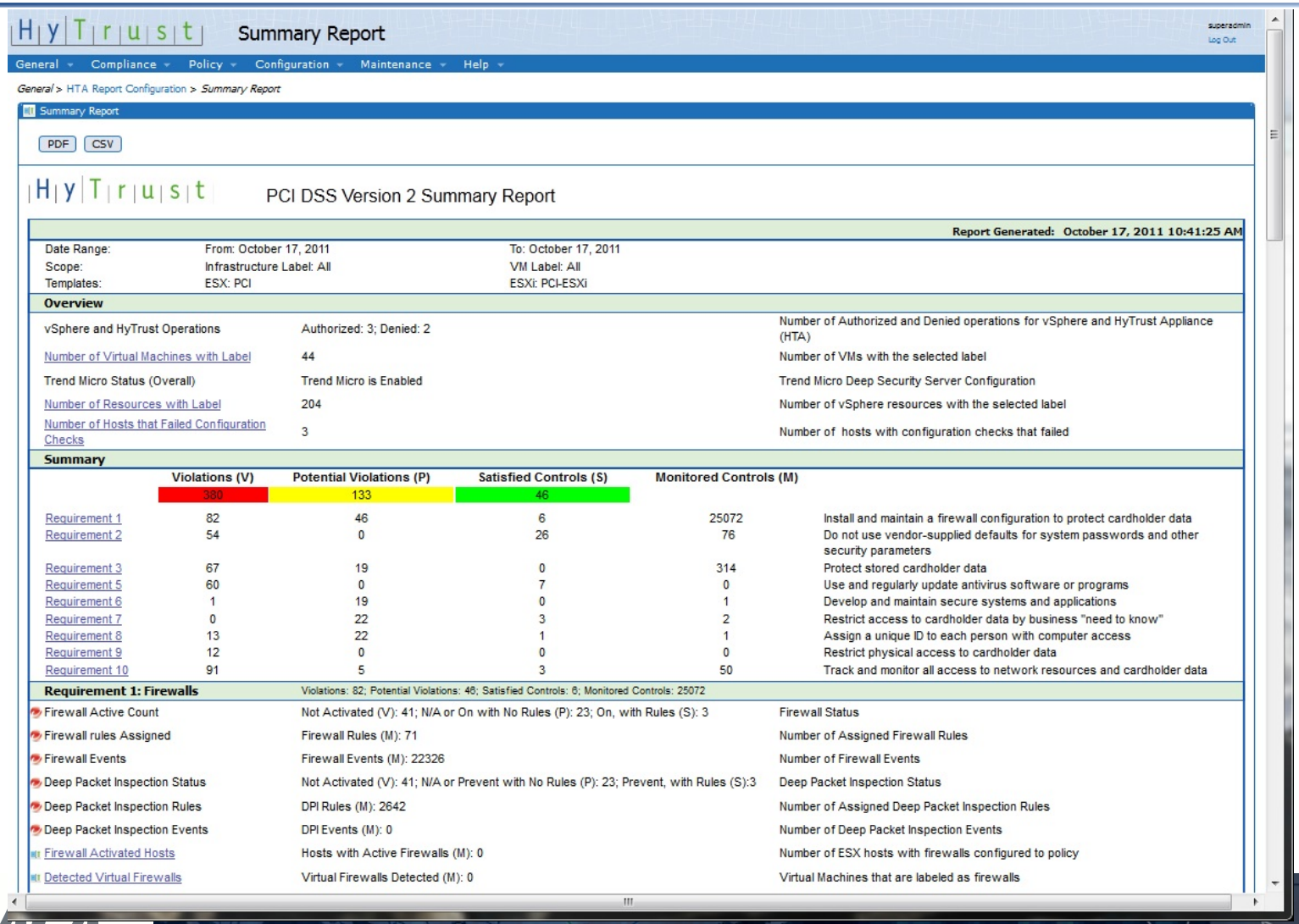
Compliance Test Results

Export as CSV

Showing 1 to 9 of 9 << < 1 > >>

Name	Description	Date/Time	Result
vm_snapshot		05/18/2011 1:37:43 PM	Passed
PCI 2.2		05/18/2011 1:37:50 PM	Passed
PCI 2.2		05/18/2011 1:37:54 PM	Passed
PCI 7.1		05/18/2011 1:38:02 PM	Passed
PCI 7.2		05/18/2011 1:38:07 PM	Passed
PCI 7.2		05/18/2011 1:38:10 PM	Passed
PCI 10.2	Syslog.Remote.Host =	05/18/2011 1:38:12 PM	Failed
PCI 10.4		05/18/2011 1:38:15 PM	Passed
PCI 10.7		05/18/2011 1:38:19 PM	Passed

Automate Comprehensive Compliance Reporting



HyTrust Summary Report

superadmin
Log Out

General | Compliance | Policy | Configuration | Maintenance | Help

General > HTA Report Configuration > Summary Report

Summary Report

PDF CSV

HyTrust PCI DSS Version 2 Summary Report

Report Generated: October 17, 2011 10:41:25 AM

Date Range:	From: October 17, 2011	To: October 17, 2011
Scope:	Infrastructure Label: All	VM Label: All
Templates:	ESX: PCI	ESXi: PCI-ESXi

Overview

vSphere and HyTrust Operations	Authorized: 3; Denied: 2	Number of Authorized and Denied operations for vSphere and HyTrust Appliance (HTA)
Number of Virtual Machines with Label	44	Number of VMs with the selected label
Trend Micro Status (Overall)	Trend Micro is Enabled	Trend Micro Deep Security Server Configuration
Number of Resources with Label	204	Number of vSphere resources with the selected label
Number of Hosts that Failed Configuration Checks	3	Number of hosts with configuration checks that failed

Summary

	Violations (V)	Potential Violations (P)	Satisfied Controls (S)	Monitored Controls (M)	
	380	133	46		
Requirement 1	82	46	6	25072	Install and maintain a firewall configuration to protect cardholder data
Requirement 2	54	0	26	76	Do not use vendor-supplied defaults for system passwords and other security parameters
Requirement 3	67	19	0	314	Protect stored cardholder data
Requirement 5	60	0	7	0	Use and regularly update antivirus software or programs
Requirement 6	1	19	0	1	Develop and maintain secure systems and applications
Requirement 7	0	22	3	2	Restrict access to cardholder data by business "need to know"
Requirement 8	13	22	1	1	Assign a unique ID to each person with computer access
Requirement 9	12	0	0	0	Restrict physical access to cardholder data
Requirement 10	91	5	3	50	Track and monitor all access to network resources and cardholder data

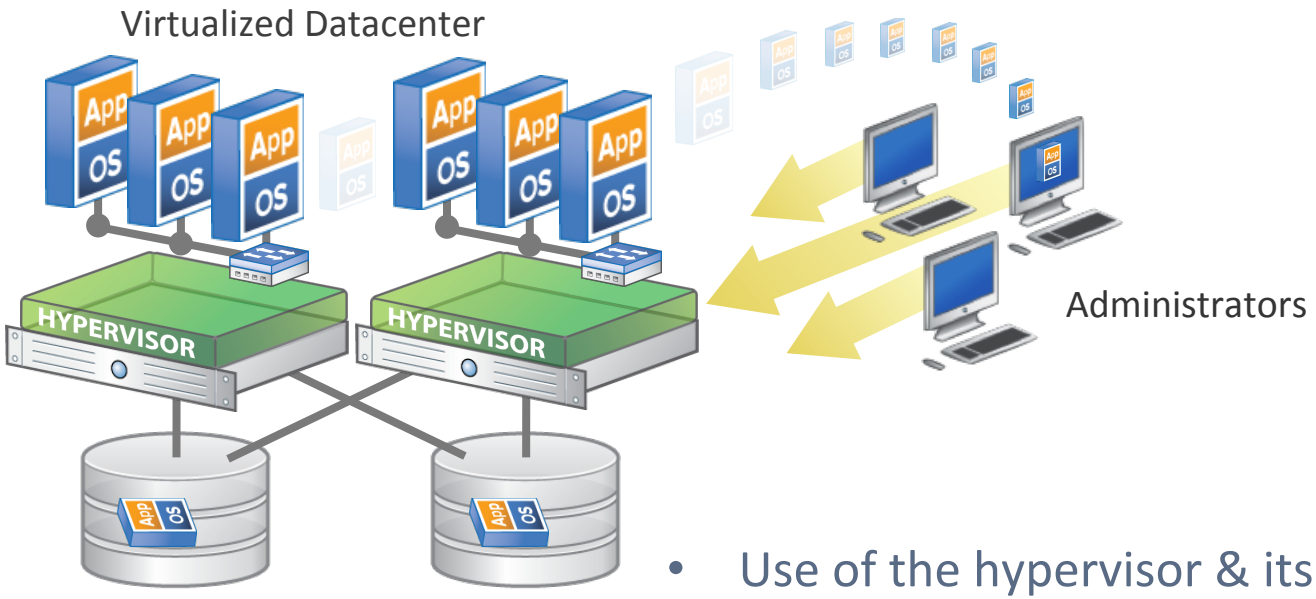
Requirement 1: Firewalls	Violations: 82; Potential Violations: 46; Satisfied Controls: 6; Monitored Controls: 25072	
Firewall Active Count	Not Activated (V): 41; N/A or On with No Rules (P): 23; On, with Rules (S): 3	Firewall Status
Firewall rules Assigned	Firewall Rules (M): 71	Number of Assigned Firewall Rules
Firewall Events	Firewall Events (M): 22326	Number of Firewall Events
Deep Packet Inspection Status	Not Activated (V): 41; N/A or Prevent with No Rules (P): 23; Prevent, with Rules (S):3	Deep Packet Inspection Status
Deep Packet Inspection Rules	DPI Rules (M): 2642	Number of Assigned Deep Packet Inspection Rules
Deep Packet Inspection Events	DPI Events (M): 0	Number of Deep Packet Inspection Events
Firewall Activated Hosts	Hosts with Active Firewalls (M): 0	Number of ESX hosts with firewalls configured to policy
Detected Virtual Firewalls	Virtual Firewalls Detected (M): 0	Virtual Machines that are labeled as firewalls

PCI Data Security Standard

- PCI Data Security Standard for protecting Cardholder Data
- Changes in PCI Data Security Standard version 2.0
  - Released October 2010; all assessments from Jan. 1, 2012 must be against 2.0
  - Explicitly states that System components include any virtualization components
  - Detailed virtualization guidance released as an Information Supplement in July 2011

Source: PCI DSS 2.0 Quick Reference Guide

Challenges & Concerns When Virtualizing CDE



- Scope: identify & consider 'included in or connected to'
- Segmentation of different security/trust zones and workload tiers

- Use of the hypervisor & its management systems/interfaces/ consoles
- Storage of cardholder data
- Access control & separation of duties
- Logging and alerting

CDE Virtualization Checklist

- Take a risk-based approach: identify all CDE system components and note if virtual or physical, and their primary function and owner
  - Consider the risk aggregated when running multiple in-scope virtual machines/appliances/security appliances on a single or cluster of hypervisors and implement adequate PCI DSS controls
    - Secure the hypervisor as it is most critical system component (including its management system/interfaces/consoles)
  - Manage complete life-cycle of in-scope VMs
    - Secure VM-to-VM traffic that remains within the hypervisor(s)
    - Ensure in-scope VMs or other objects are not moved to non-compliant environments
    - Leverage optimized, virtualization-aware firewall and anti-virus solutions
- Update processes to account for the greater management flexibility
  - Pay attention to roles definition, access control and logging
    - Privileged access to the hypervisor

NIST SP 800-125: Virtualization and Security Concerns

- Additional layers of technology
- Many systems on a physical system
- Sharing pool of resources
- Lack of visibility
- Dynamic environment
- May increase the attack surface

Recommendations for Security for Full Virtualization Technologies

- Risk-based approach
- Secure all elements of a full virtualization solution and perform continuous monitoring
- Restrict and protect administrator access to the virtualization solution
- Ensure that the hypervisor is properly secured
- Carefully plan the security for a full virtualization solution before installing, configuring, and deploying it

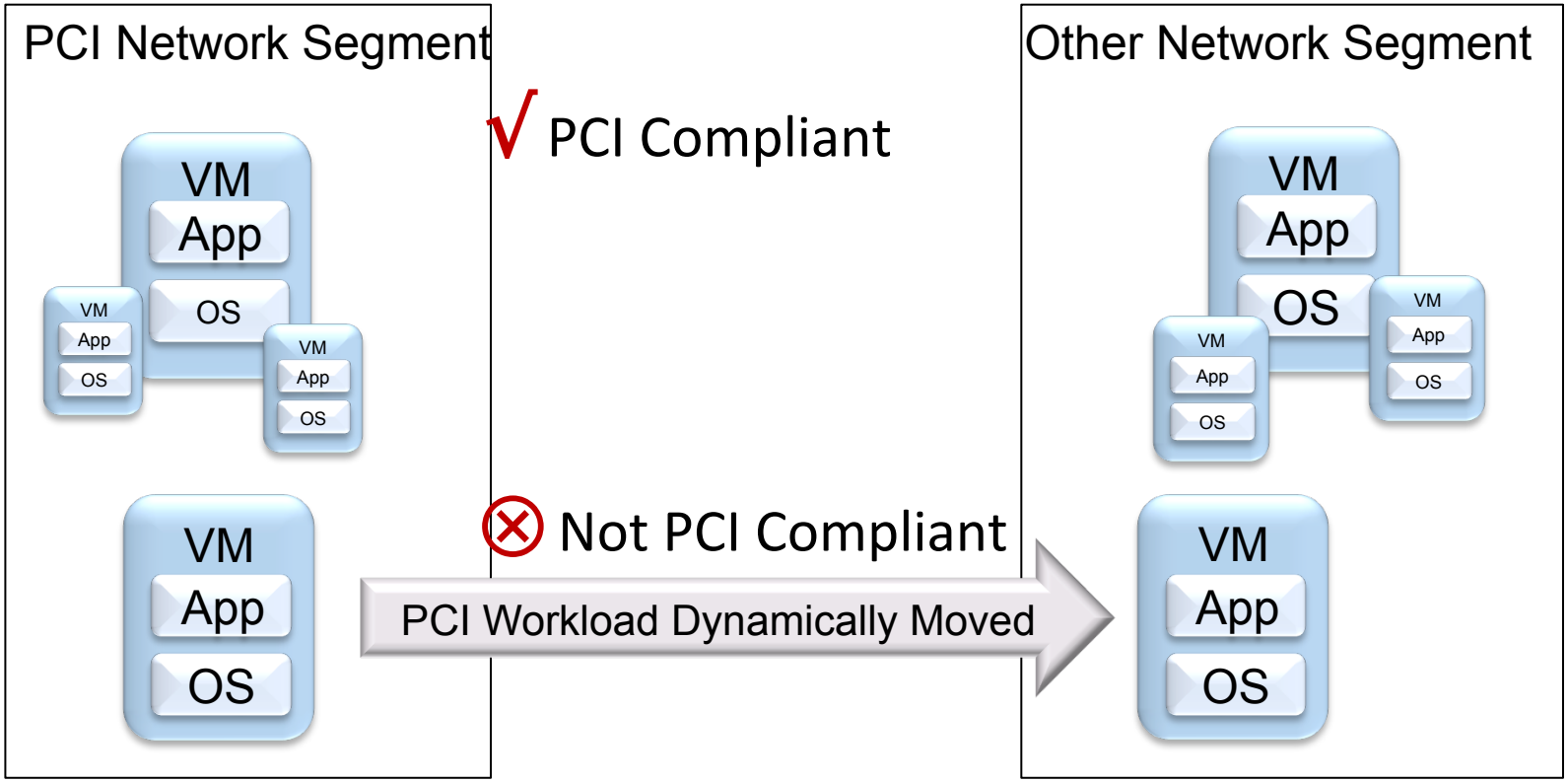
Summary of Threats and Countermeasures

- Intra-guest vulnerabilities
  - Hypervisor partitioning
- Lack of visibility in the guest OS
  - Hypervisor instrumentation and monitoring
- Hypervisor management
  - Protect management interface, patch management, secure configuration
- Virtual workload security
  - Management of the guest OS, applications, data protection, patch management, secure configuration, etc
- Virtualized infrastructure exposure
  - Manage access control to the hardware, hypervisors, network, storage, etc.

Agenda

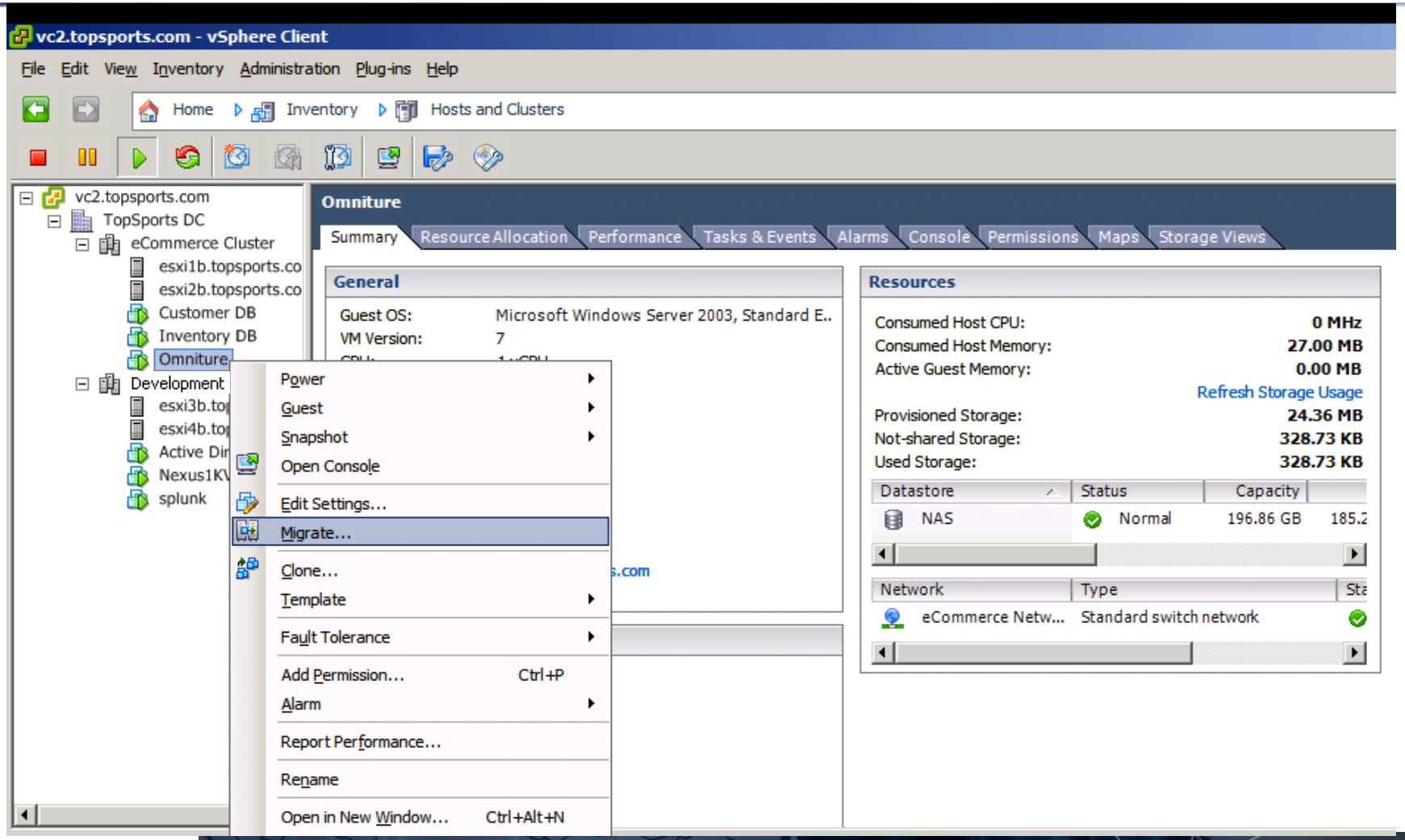
- End-to-End Security and Compliance Guidance

Compliance Challenge: Moving Workloads

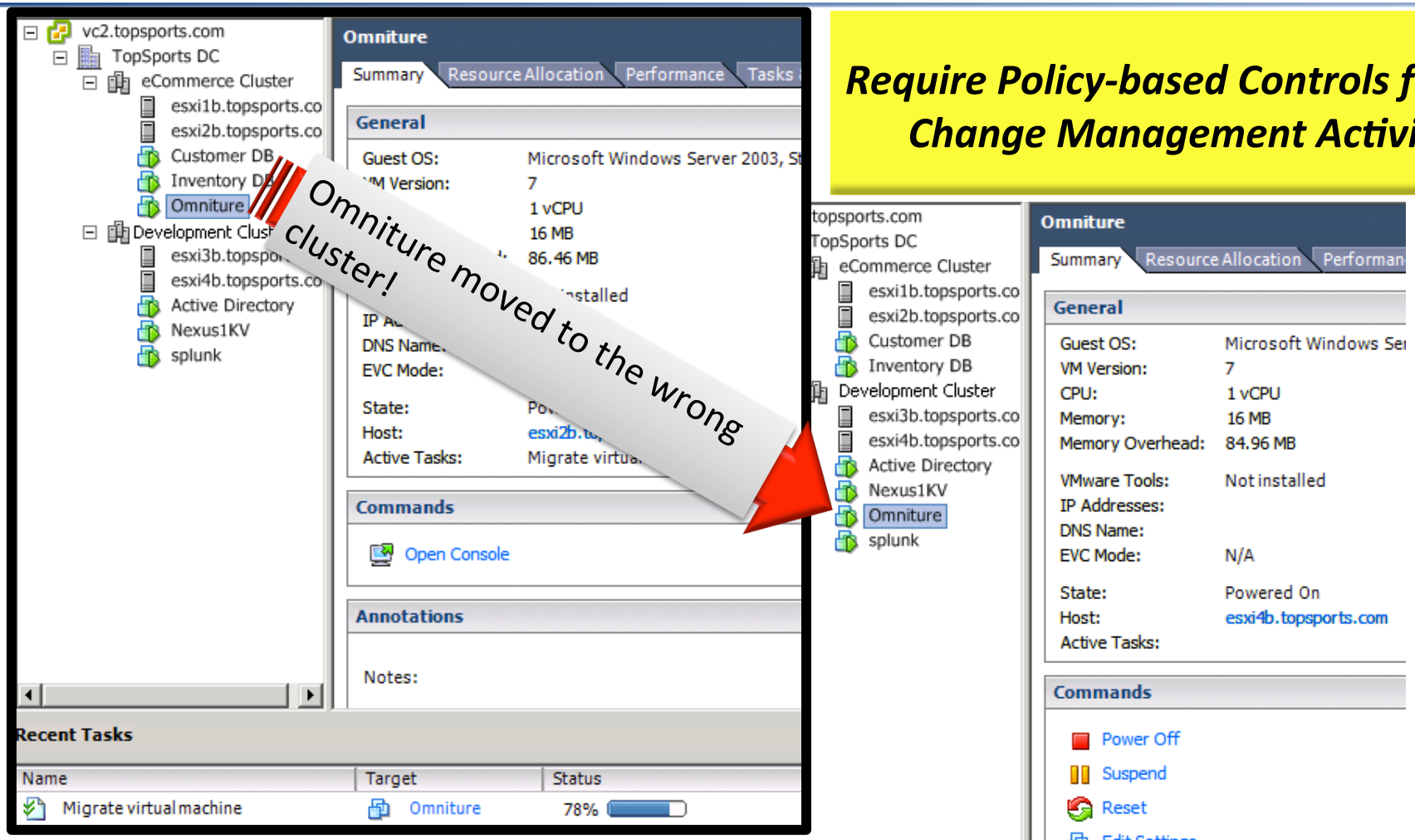


PCI = Payment Card Industry Data Security Standard

Non-Compliant VM Movement



VM is now moved to the wrong cluster!



Require Policy-based Controls for all Change Management Activity

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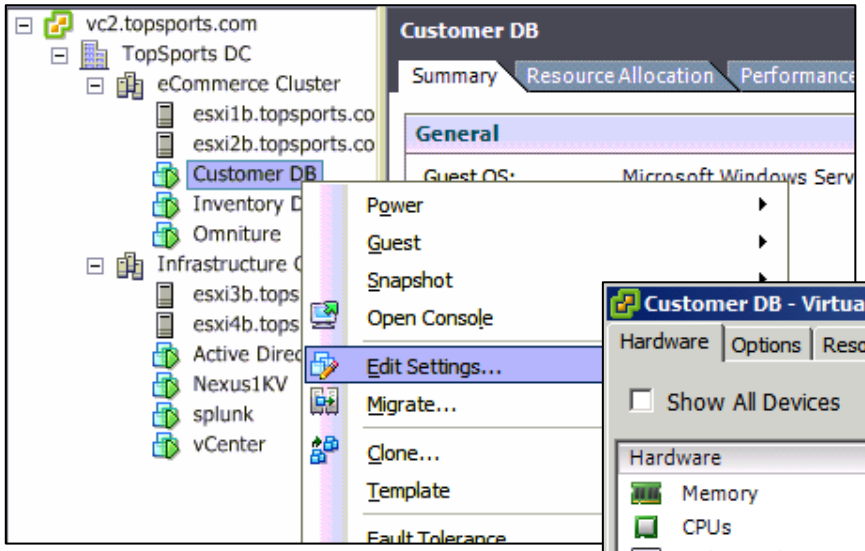
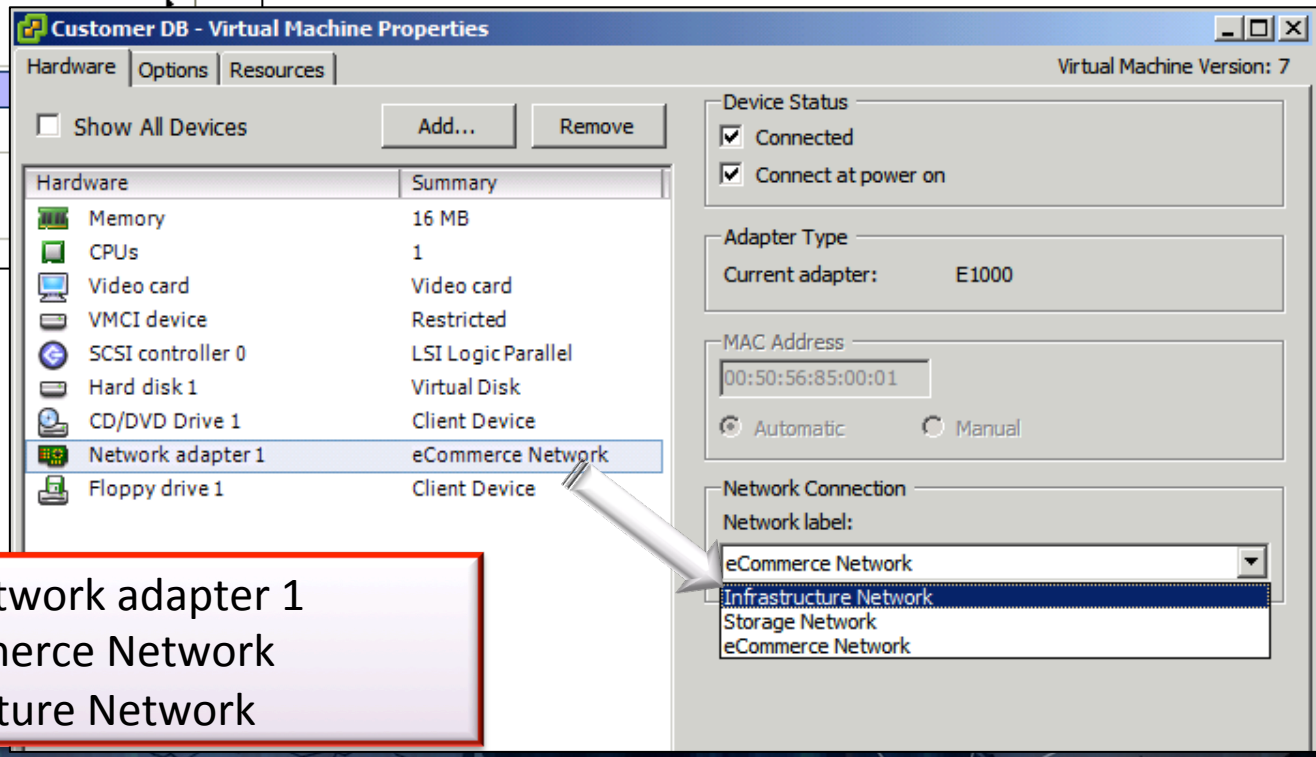
VM reconfiguration: network change

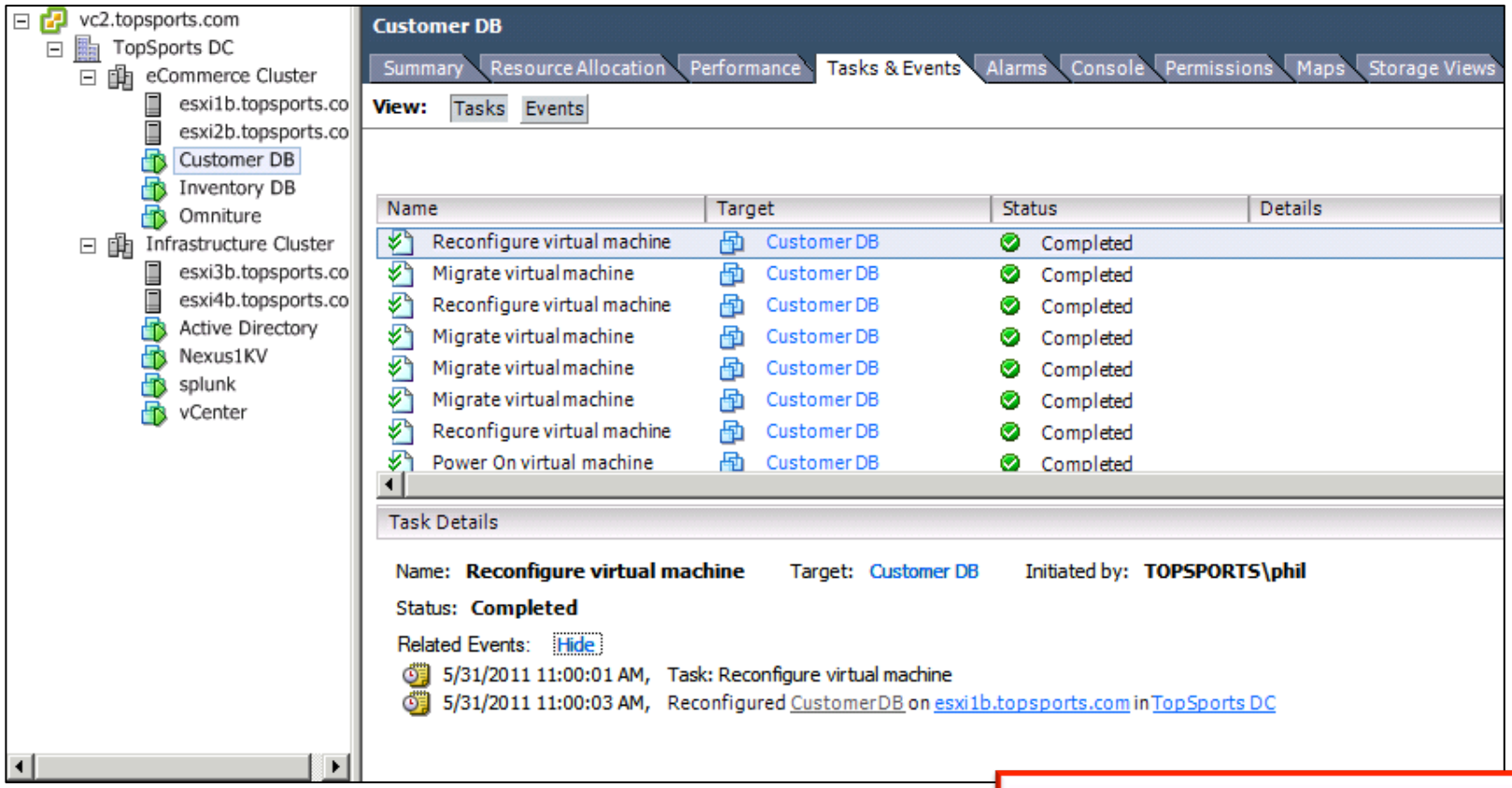
Require Policy-based Controls to ensure that authorized users do not accidentally/ intentional break compliance





Changing Network adapter 1
From eCommerce Network
To Infrastructure Network

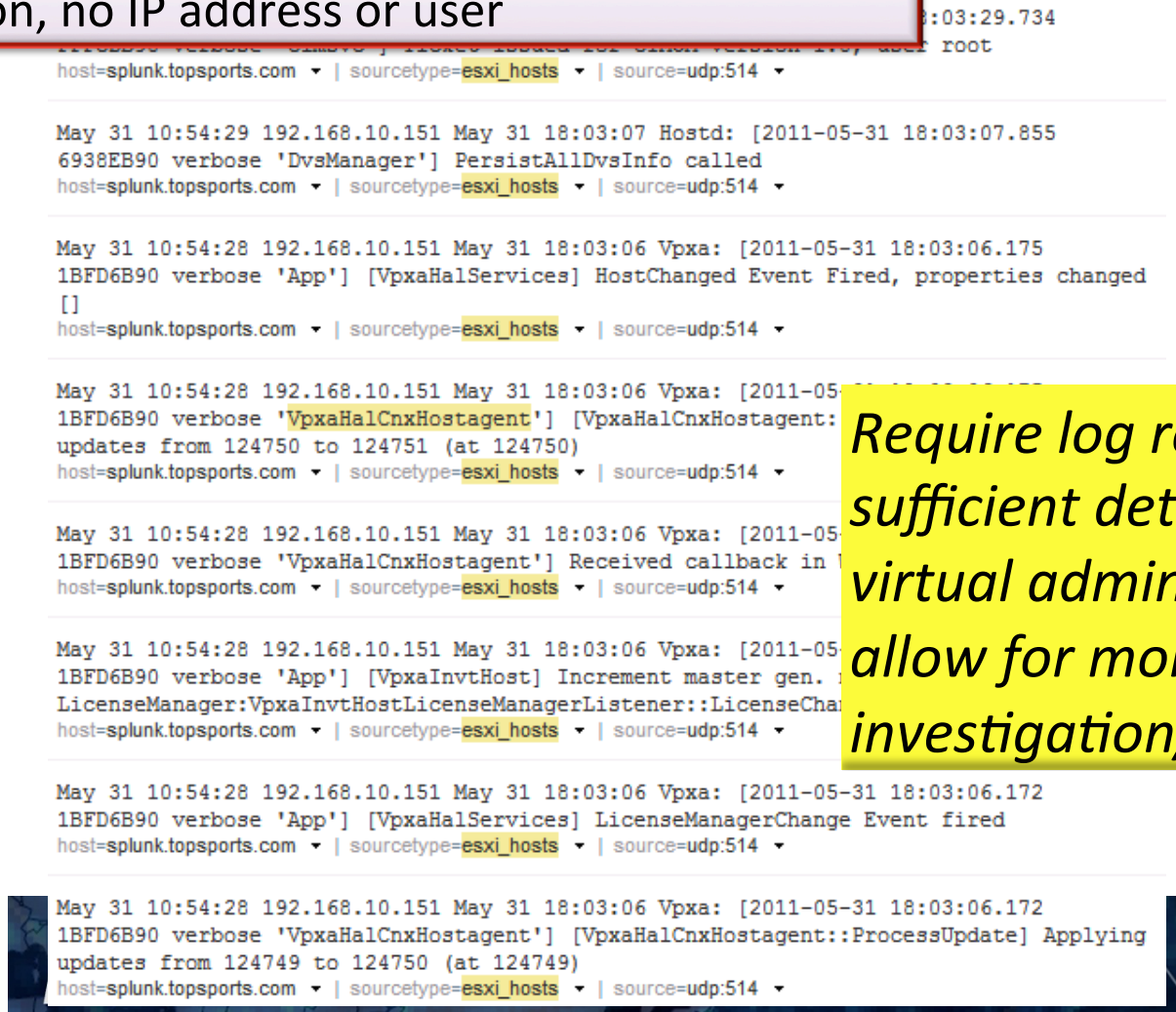
Compliance Challenge: Insufficient Logging



Missing IP address and no indication that the network adapter was reconfigured

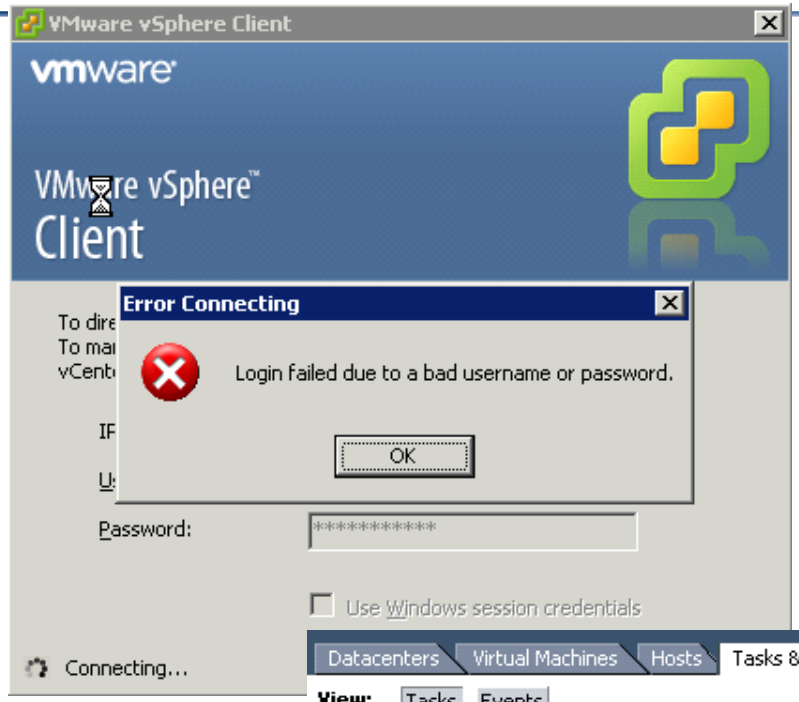
Insufficient Logging

Confusing host logs with insufficient details to identify specific action, no IP address or user

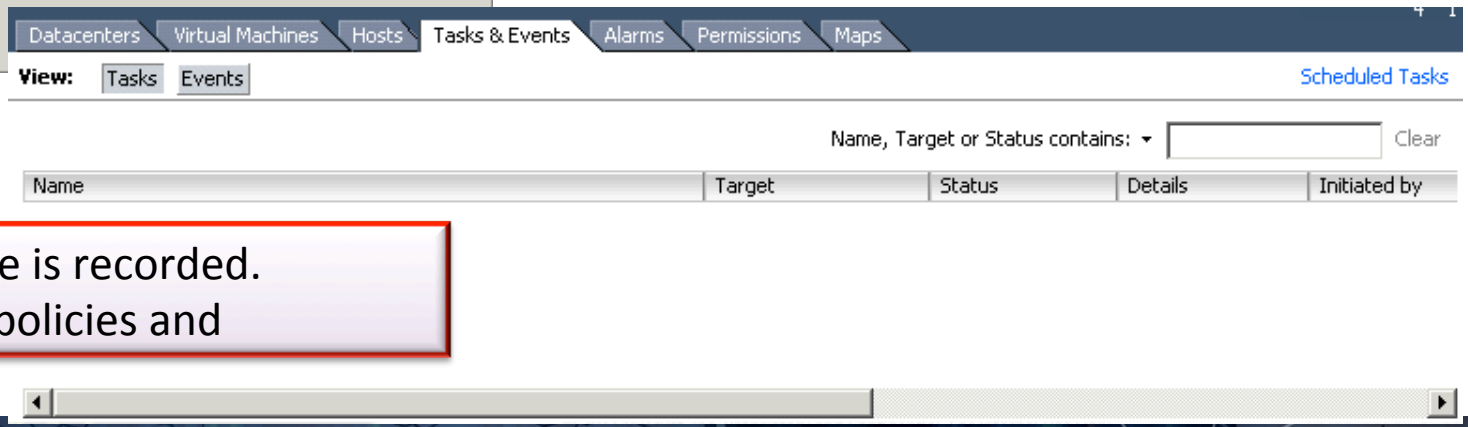


Require log records with sufficient details for all virtual admin actions to allow for monitoring/ investigation/forensics

Compliance Challenge: Insufficient Log Records



Require Log Records of all Change Management Activity (denied/failed and allowed)



No log message is recorded. Violates most policies and standards.

End-to-End Security & Compliance Guidance

- Virtualization increases the risk and complexity of compliance so engage your auditors early to streamline the audit process
- Look beyond traditional security vendors for solutions that address virtualization specific requirements (hypervisor/VM controls)
- View virtualization as an **opportunity to improve your current processes**
  - reporting, monitoring, inter-VM controls, etc.
  - achieve objectives that you always wanted in physical environments but could not afford or were restricted by legacy infrastructure
- Embrace virtualization with a virtualization by default approach and build compliance into the default mode of operation

Questions?

Resources

- ISACA Virtualization Checklist - http://www.isaca.org/Knowledge-Center/Research/Documents/Virtualization-Security-Checklist-26Oct2010-Research.pdf
- http://www.isaca.org/Knowledge-Center/Research/ResearchDeliverables/Pages/Virtualization-Benefits-and-Challenges.aspx
- PCI Security Standards Council: https://www.pcisecuritystandards.org/index.php
- NIST: http://csrc.nist.gov/publications/index.html
- Adaptive Computing: http://www.adaptivecomputing.com
- HyTrust: http://www.hytrust.com/resources/main
- Trend Micro: http://us.trendmicro.com/us/solutions/enterprise/security-solutions/compliance/