



# Virtualisation Best Practices

Heath Newburn

# PulseANZ 2010

Meet the people who can help  
advance your infrastructure



# As the world gets smarter demands on the infrastructure will grow



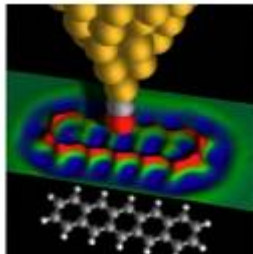
Smart traffic systems



Intelligent oil field technologies



Smart food systems



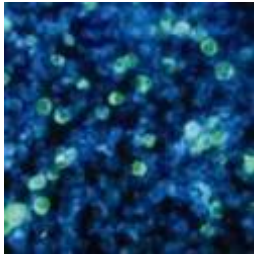
Smart healthcare



Smart energy grids



Smart retail



Smart water management



Smart supply chains



Smart countries



Smart weather



Smart regions



Smart cities

# IT operations must become more efficient in delivering services

## Challenge:

- How can you increase efficiency to address today's challenges and prepare for tomorrow's opportunities?
  - Maintenance costs: \$8 for every dollar spent on infrastructure.\*
  - Energy costs: 50 cents for every dollar spent on hardware.\*

“... the days of focusing on physical system management are now gone. Upper-level management wants greater IT operational efficiencies. CIOs require resources to be virtualized to **increase resource utilization and simplify management, and that data center energy consumption be reduced.**”

- Clabby Analytics, March 2009



“Virtualization without service Management is even more dangerous than not virtualizing in the first place” - Gartner

THE SERVER  
VIRTUALIZATION  
PROJECT IS DONE,  
AND THERE ARE NO  
TROUBLE TICKETS.

MY RATES MIGHT  
SEEM STEEP, BUT  
REMEMBER, THERE  
ARE NO TROUBLE  
TICKETS.

OUR ONLINE  
TROUBLE TICKET  
SYSTEM IS BROKEN.



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# Integrated Service Management Maximizes the Potential Benefits of Virtualization & Leverages Virtualization for Added Business Value

## Visibility



## Control



## Automation



### Reduce Cost

- Reduce labor cost
- Improve infrastructure & energy utilization
- Integrated visualization of IT & Non-IT assets

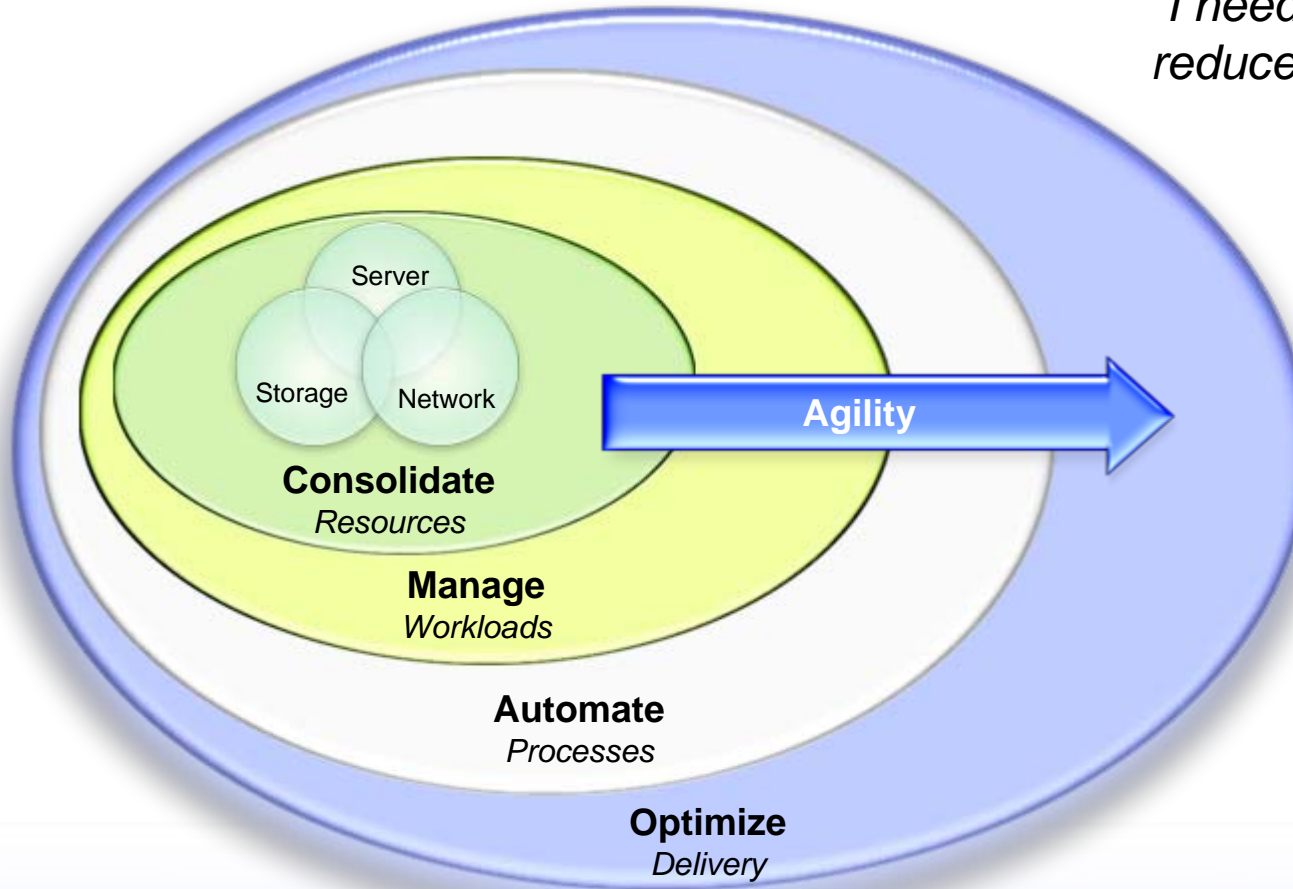
### Manage Risk

- Improve uptime/availability and increase recoverability
- Improve quality

### Improve Service

- Improve performance and optimize scalability
- Improve service levels
- Respond to new business opportunities quickly

# Virtualization with Integrated Service Management for improved business agility



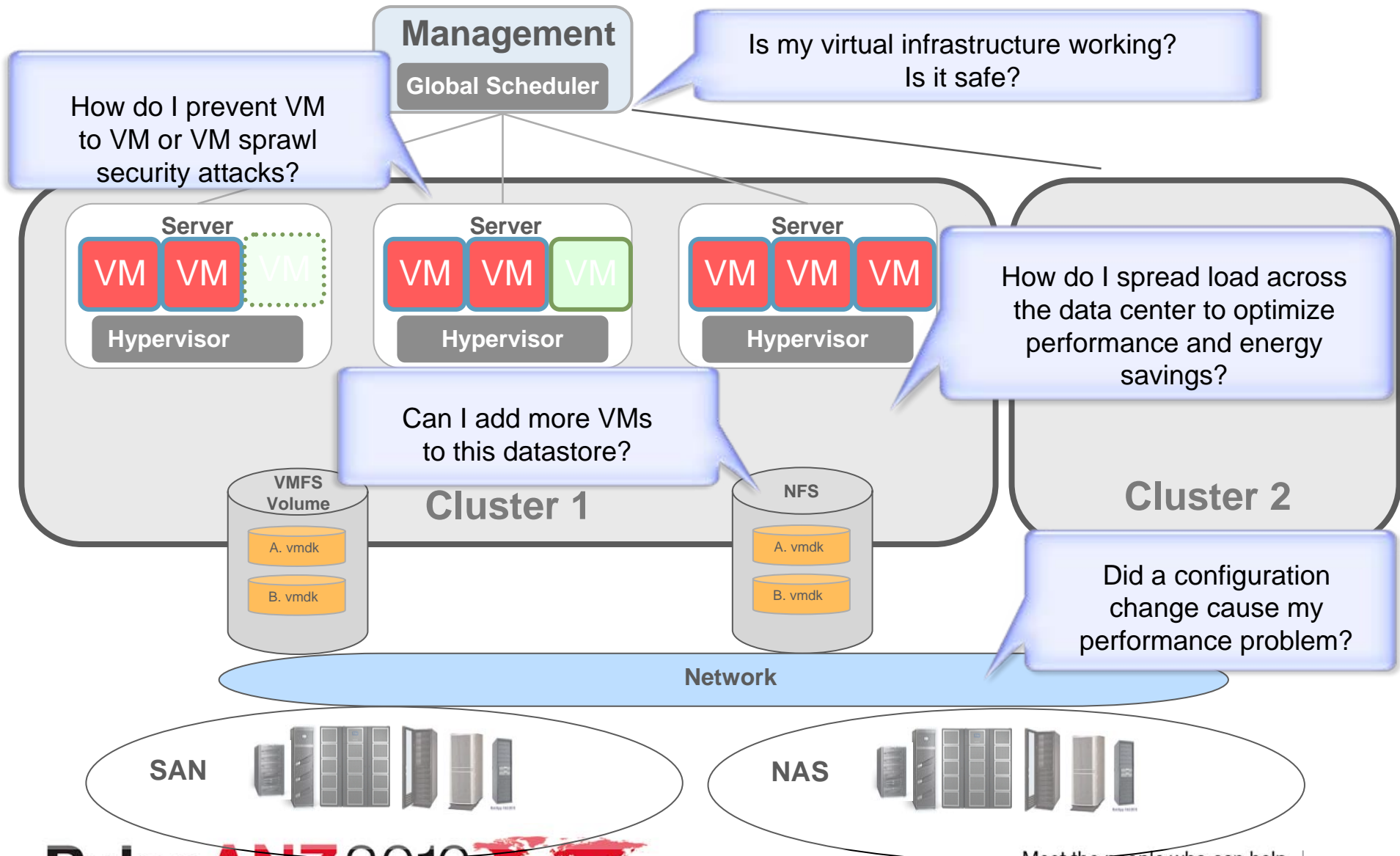
*“I need to **consolidate** to reduce sprawl & CAPEX.”*

*“I need to **manage** my workloads to rapidly respond to changes in capacity requirements and to ensure high availability of this environment.”*

*“I need to **automate** my processes to consistently & quickly respond to business requirements.”*

*“I need to **optimize** to create value & improve IT’s ability to rapidly support business innovation.”*

# Virtual Environment – Shared Environment



# Key Capabilities

*Virtualization Management*

*Availability, Performance & Capacity Management*

*Energy Management*

*Configuration Management*

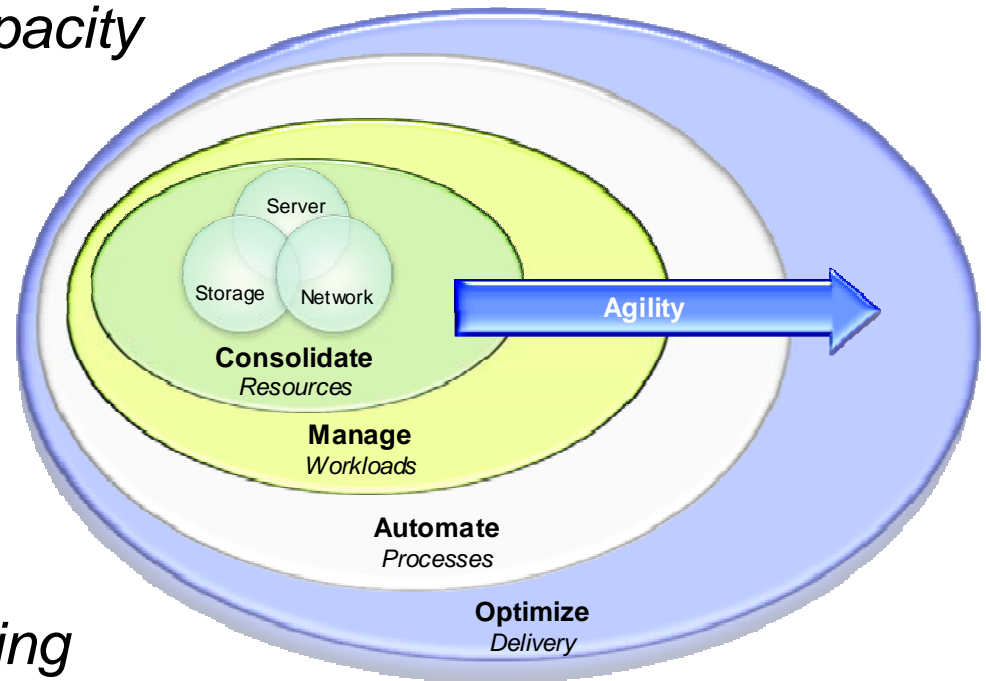
*Workload Automation*

*Security Management*

*Image Management, Provisioning*

*Self-Service Automation*

*Financial Management*





# Unify Virtualization Management with VMControl

*Software that delivers consistent management of single virtual systems or pools of cooperating systems for all IBM server environments*

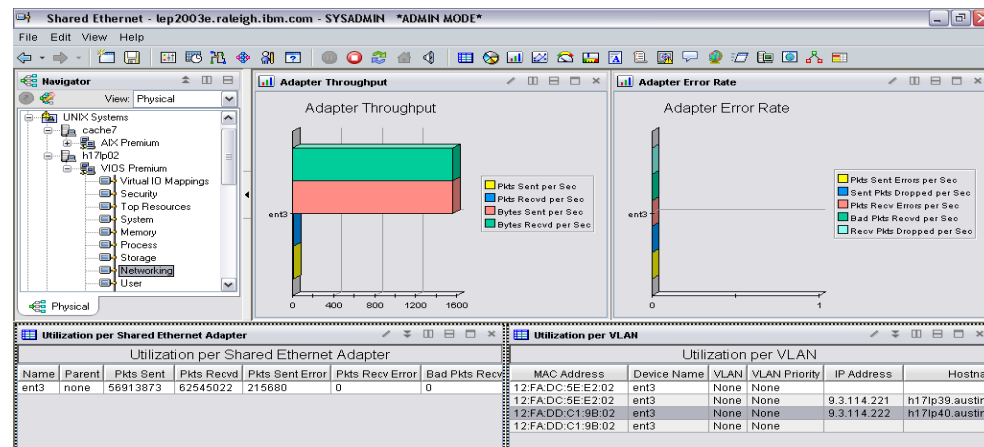
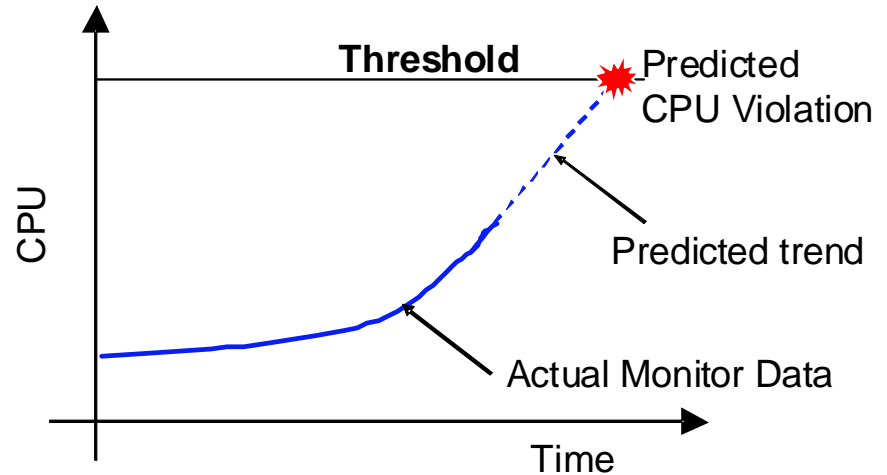


## VMControl features:

- Discover virtual resources
- Display inventory and topology
- Monitor virtual resource health
- Relocate virtual resources
- Create and manage virtual servers
- Deploy and manage workloads
- Provision and manage virtual images
- Manage virtual resource pools

# End to end application performance analysis improves service levels and reduces infrastructure costs.

- Collect key performance and availability metrics from applications to virtualized resources
- Absolute, dynamic & predictive alerts
- Historical reporting to identify resource bottlenecks and plan for future capacity needs
- Monitor for physical & virtual server and virtualized storage environments with IBM Tivoli Monitoring & Total Storage Productivity Center

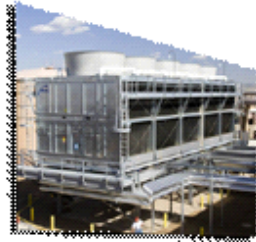


# Energy Management

**INFORMATION TECHNOLOGY**



**FACILITIES & PROPERTY**



**ASSETS**



**DISCOVER**

Measure, collect, and benchmark energy information to identify opportunities



**MANAGE**

Monitor, trend, and manage energy to control costs and risks



**OPTIMIZE**

Optimize assets and infrastructure for energy efficiency



**REPORT**

Track and verify energy efficiency for compliance and stakeholders

**GOALS**

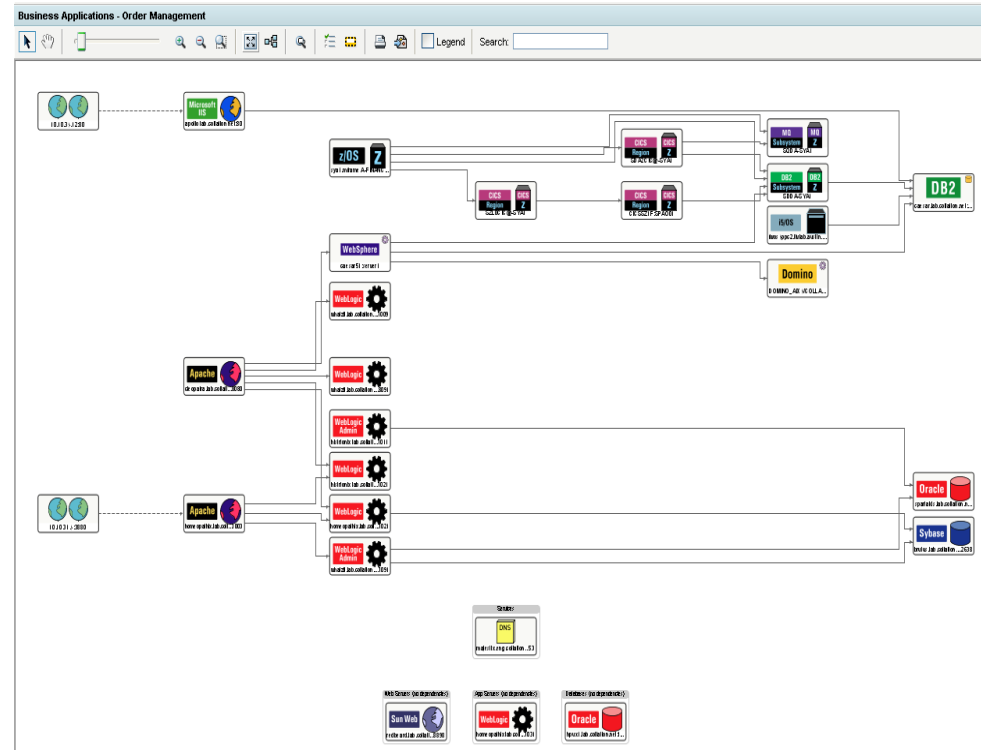
- ✓ Cost Reduction & Avoidance
- ✓ Remove Operational Barriers
- ✓ Manage Risk and Streamline Compliance

*...yields an efficiency gain of 30% for power & cooling costs alone.*

# Configuration Management

- Discover physical & virtual environments & their dependencies
- Track and report on configuration changes for quick problem isolation
- Compare configurations across like resources or against the “gold standard”

*...improves the success rate for change & release deployments by 10-30%*



# Automate Network Configuration Management & Provisioning

*Intelliden has demonstrated technology and expertise to provide automated network change, configuration, provisioning and compliance management for next-generation networks, data centers and cloud-based services*

## ✓ Proven Scalability

- ✓ Production hardened solution
- ✓ Can scale up to 100Ks & scale down to 100s of devices

## ✓ Revolutionary SmartModel™ Technology

- ✓ Enforces command syntax, semantics and ordering
- ✓ State-aware changes for maximum accuracy
- ✓ Non-disruptive rollback with zero downtime
- ✓ Granular access control by user device and command

## ✓ Multiple Automation Modes for different skills and needs

## ✓ Comprehensive Compliance Management

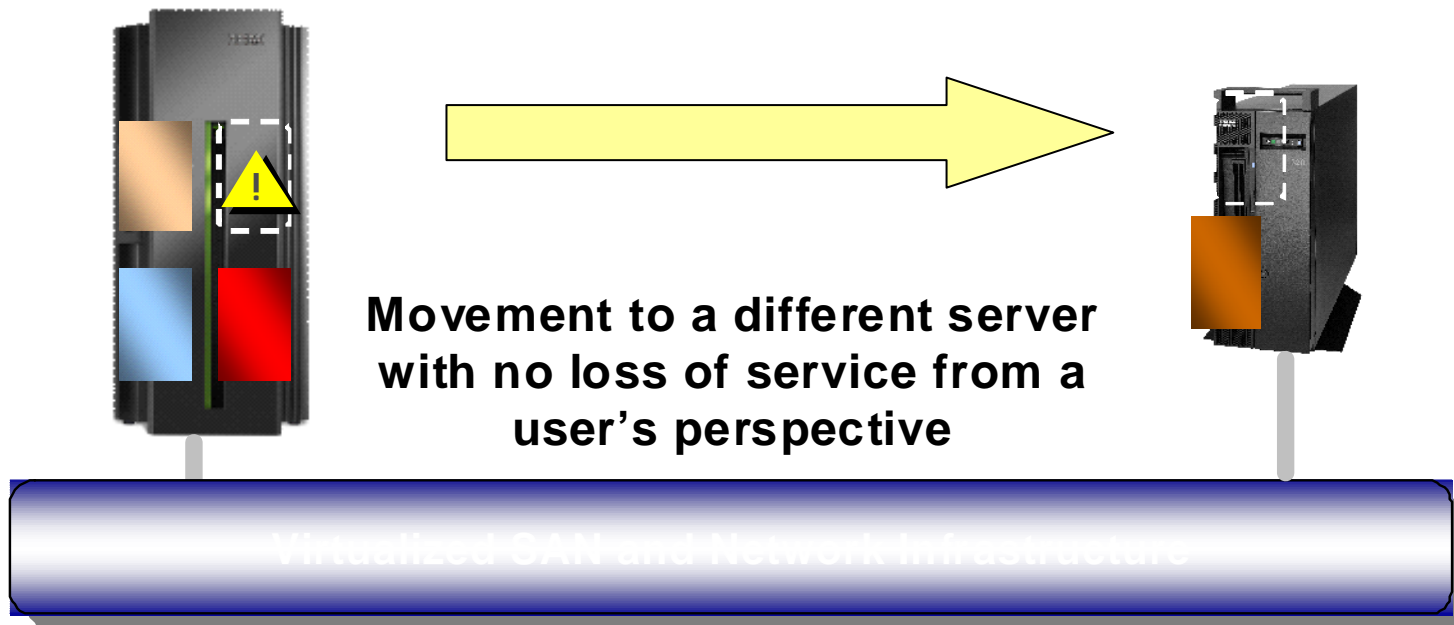
## ✓ Open APIs for rapid integration with existing management applications and business processes



# Workload Automation – Migrate Virtual Workloads

## Workload automation capabilities:

1. Monitor server health.
2. If a hardware error occurs:
  - a. Migrate the workload via the Systems Director VMControl
  - b. Alert the Power server administrator

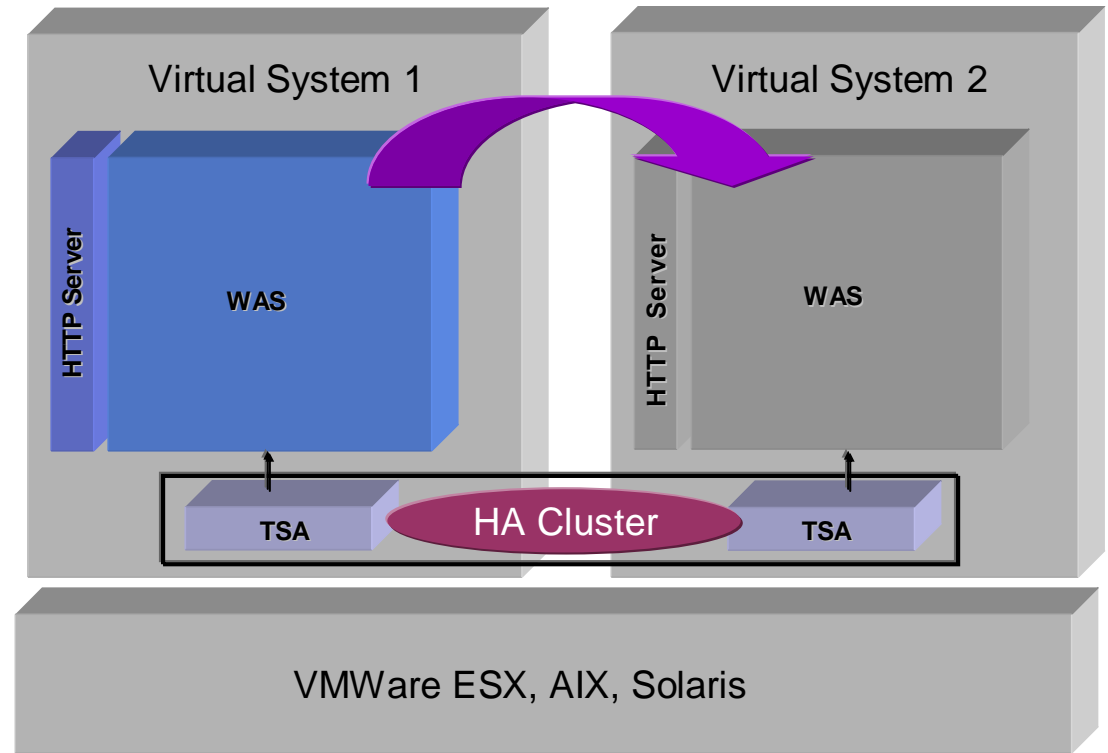


**Movement to a different server  
with no loss of service from a  
user's perspective**

**Migrate a running LPAR to another physical server**

# Workload Automation – Migrate Applications

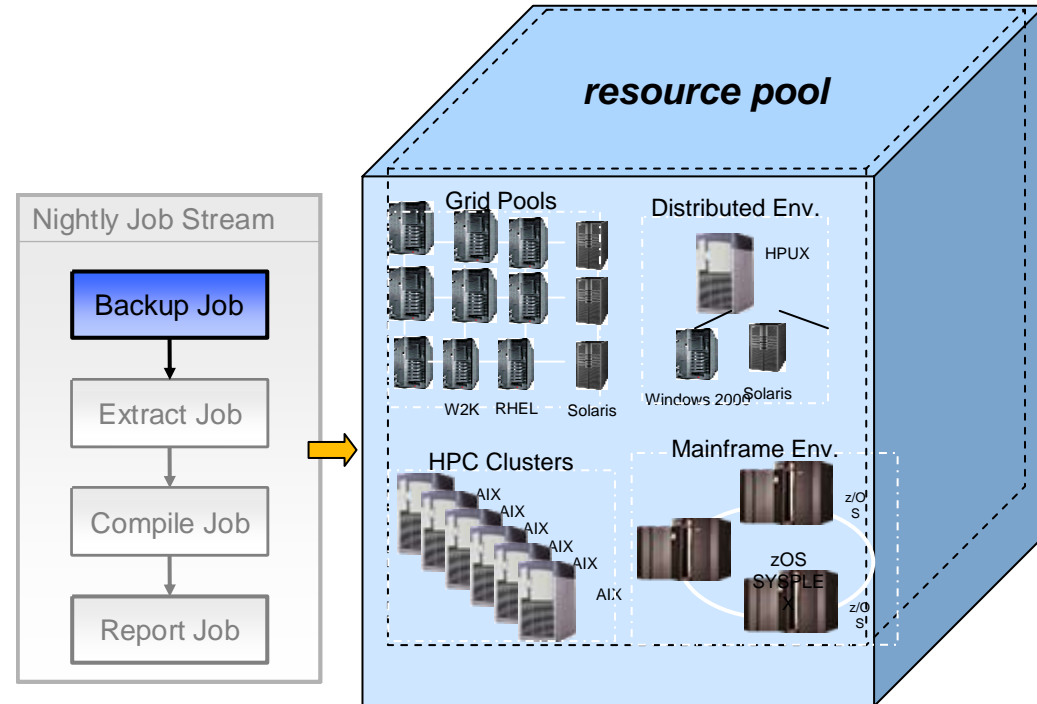
- Monitor application processes, when application goes down, fail over to another virtual system.
- Start or stop application components on all platforms with a single action in the right order.
- Increase application availability by resolving cross-platform dependencies, like recycling a Web application on Linux when IBMDB2® for z/OS is down.



*...to resolve issues quickly, while minimizing the need for IT staff to intervene.*

# Workload Automation-Define when & where application jobs execute

- Define tasks in a workflow (e.g. transaction processing, content mgmt, etc.)
- Associate workflow with dependencies and a schedule
- Distribute work to available resources (or provision new resources) to ensure the job is run on schedule
  - Run jobs on any computer with the right resources, and pick the fastest machine currently available
  - Limit how many jobs of a certain type execute at once, to follow software licenses
- Display results-did the job complete without errors and on time?

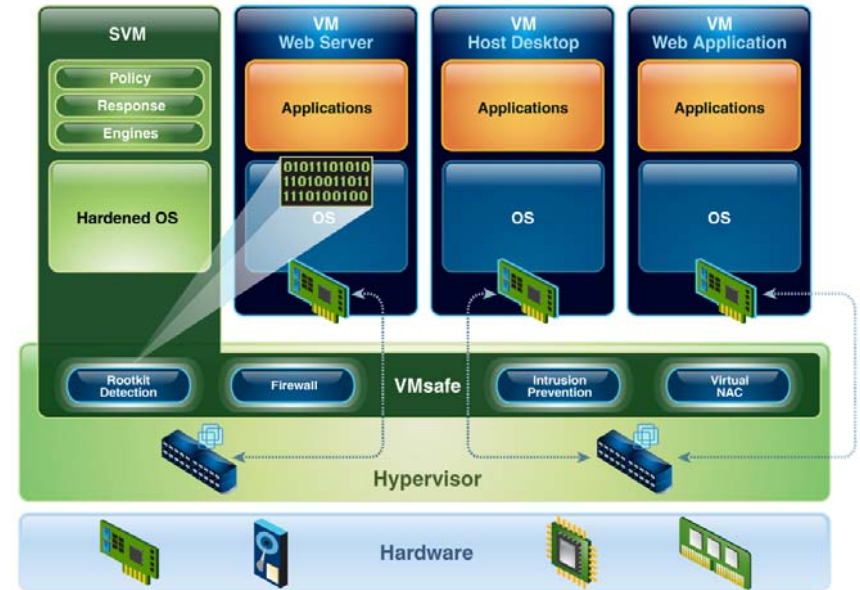


**...to reduce transaction processing times by 80%**



# Eliminate Security Threats of New Shared Environments

- Authentication and role-based access control
- Isolation Management for Servers, Storage & Networks
- Integrity management
- Risk and Compliance – Auditing, Configuration Management & Regulatory Compliance
- Threat / Malware Management



**IBM Virtual Server Security for VMware** helps customers to be more secure, compliant and cost-effective by delivering integrated and optimized security for virtual data centers.

# Provision Resources & Services Dynamically

## Automation and Enforcement of IT Processes

*TPM is an end-to-end automation package. It captures a customer's existing procedures by linking together their systems management tools and executing those and new processes in a repetitive error-free manner either within or across organizational boundaries.*

**TPM'S GREATEST STRENGTH IS EXPLOITATION OF A CUSTOMER'S EXISTING PROCESSES!**

**End-to-End Automation** →

### Servers and Software



**Hardware and Operating Systems**  
 pSeries (NIM/CSM) HP-UX (Ignite)  
 xSeries (RDM) HP (RDP)  
 Windows (ADS) SUN (Jumpstart)  
 Linux (Kickstart) Altiris DS

#### Virtual Servers

i/pSeries – (HMC)  
 VMware – Virtual Center/ESX  
 Microsoft Virtual Server 2005

**Software Distribution**  
 Tivoli Configuration Manager

**Application Software**  
 WebSphere BEA  
 DB2 Microsoft SQL  
 Linux SAP  
 Citrix Apache

### Networks



**Routers and Switches**  
 Cisco  
 Brocade  
 Extreme  
 Foundry

#### Load Balancers

Alteon  
 F5 Networks  
 Cisco  
 Nortel

**Power Distribution Units**  
 APC

### Storage



**IBM Storage**  
 ESS  
 IBM DS4000

**EMC Storage**  
 Symmetrix

#### Switches

Brocade  
 McData  
 Cisco

**IBM Systems and Technology Group**  
 TotalStorage Productivity Center

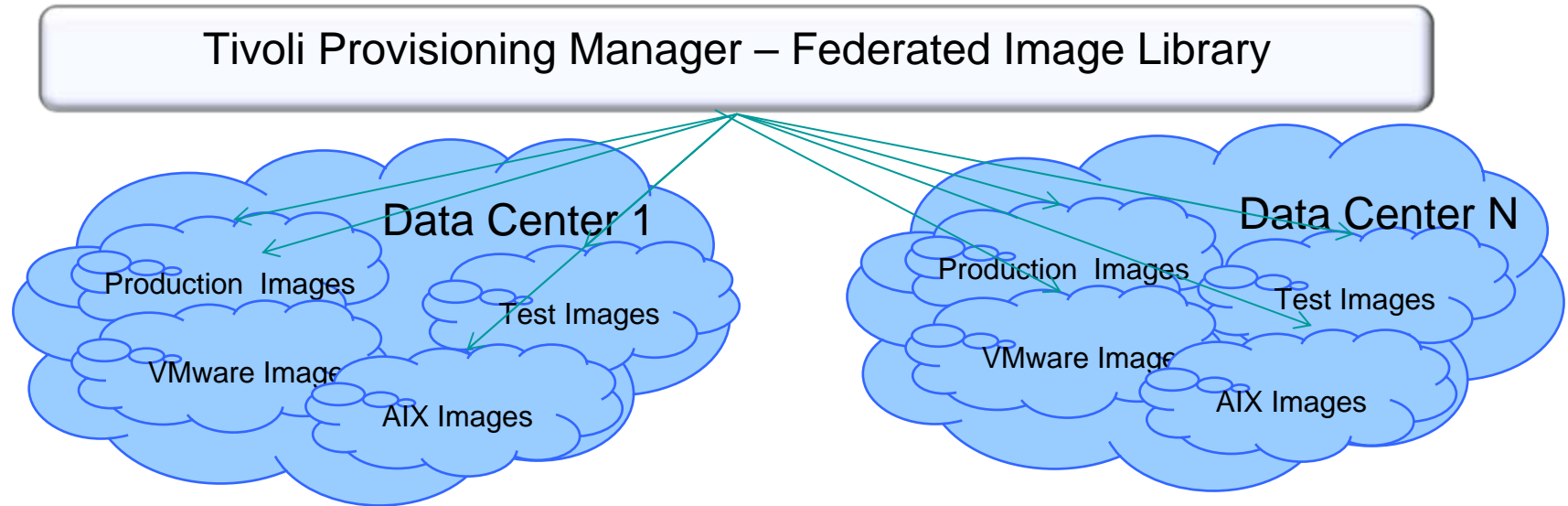
### Security



**Firewalls**  
 Cisco  
 Nokia  
 Checkpoint

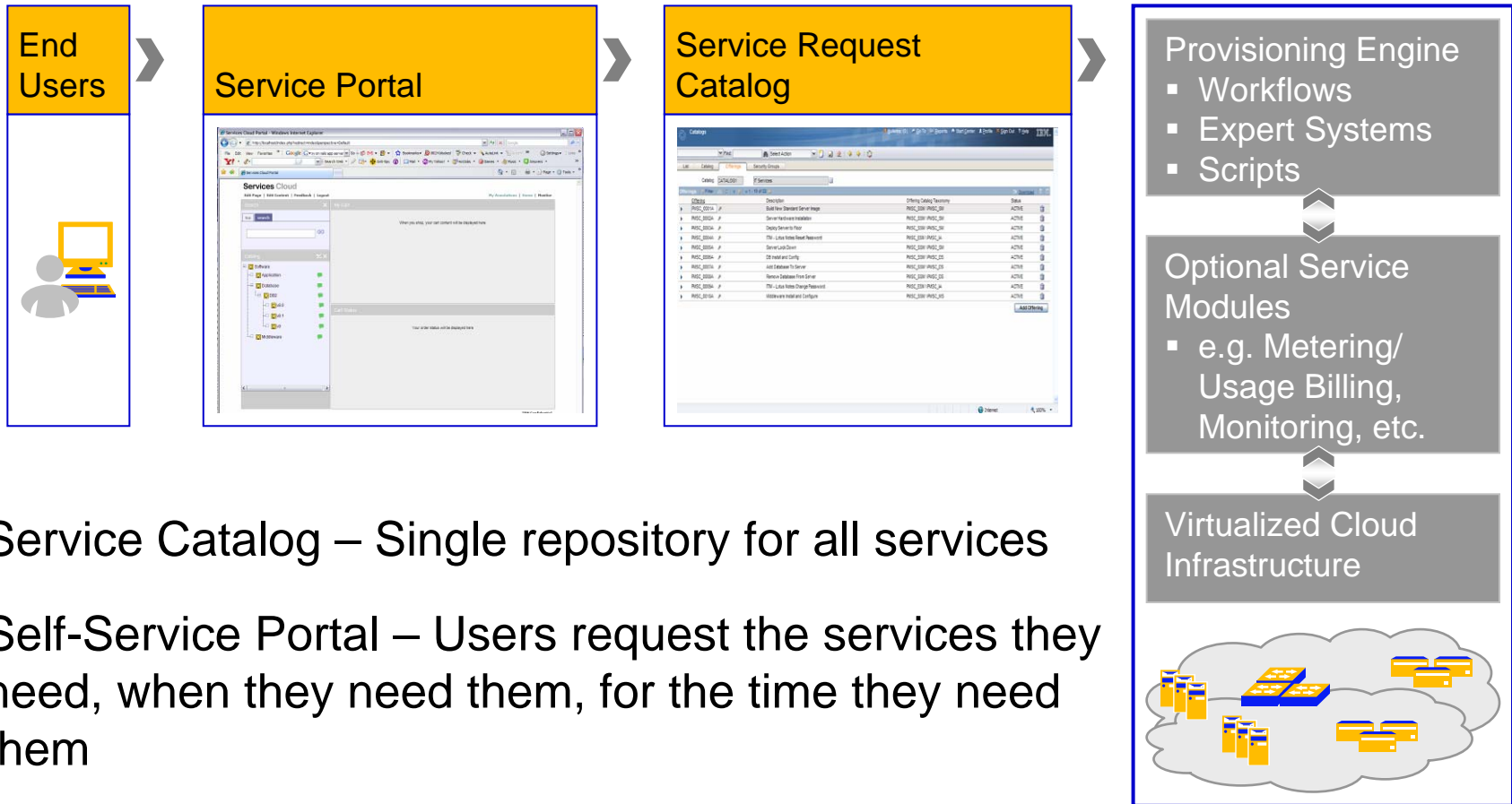
**IBM Tivoli Products**  
 IBM Tivoli Security Compliance Manager

# Capture, Deploy and Manage Images to Improve Flexibility & Reduce Labor Costs



- A single tool that manages all the virtual images in conjunction with the resource managers and hypervisor managers like Systems Director VMcontrol and VMware vCenter.
- Dynamically capture and templize images with Tivoli Provisioning Manager & VMControl
- Track versions, owners, deployments, & content of images using OVF
- Manage physical and virtual images, convert between them
- Federates IBM and non-IBM platform repositories

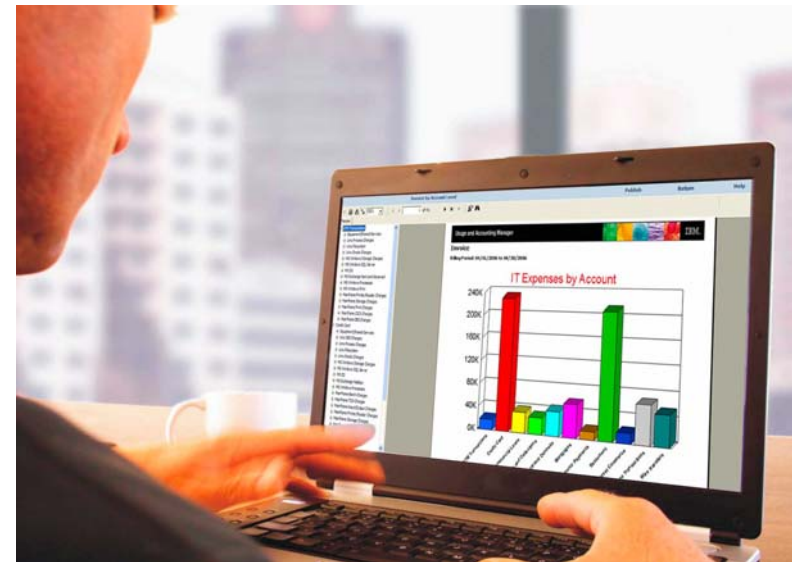
# Self-Service Automation Accelerates Service Delivery & Improves Utilization of Resources



- Service Catalog – Single repository for all services
- Self-Service Portal – Users request the services they need, when they need them, for the time they need them
- Tivoli Service Automation Manager integrates key IT processes like change management

# Financial Management - Manage “True Economics” of Shared Resources

- Track & report departmental use and related costs of virtualized servers
- Establish pricing and invoice users based on popular cost allocation methods
- Leverage integration of Tivoli Usage & Accounting Manager & Tivoli Service Automation Manager to bill customers based on service hours used
- Automatically manage the software license chaos created by virtual server sprawl with Tivoli Asset Discovery



# Star Technology

Monitoring customers' Web sites to prevent outages

## Business challenge:

Star Technologies (Star) needed to meet stringent service level agreements (SLAs) and help ensure that its customers' operations were always available, and thus required a monitoring infrastructure that could grow as the number of customers increased.

## Solution:

Star uses IBM Service Management solutions for service quality management to provide end-to-end visibility for its customers' IT infrastructure through a single customizable workspace portal to deliver optimized service within agreed service levels. The company can set thresholds for alerts to situations which may cause problems, such as disks filling up, so that it can proactively intervene to avert downtime.

## Benefits:

- Ability to proactively correct potential failures for its customers
- Reduced operational administration overhead through automated processes
- Scalability to grow from 1,000 servers to 10,000 without increasing the supporting infrastructure or creating an exponential rise in operational resources
- Holistic view of its data center, including energy consumption, allows Star to provide customers with green options

*“Star has built a successful cloud computing infrastructure using IBM Tivoli Monitoring software and working closely with IBM.”*

— Mark Whitehead, Manager,  
Enterprise Management Systems,  
Star Technology

## Solution components:

- IBM Service Management Solution



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# Beijing University

## Expands academic research programs by creating a cloud environment that manages high-performance computing clusters



### The Need:

This leading Asian technical university had evolved separate clusters of high-performance computing (HPC) servers that couldn't easily work together. The university, which specializes in bioscience and urban planning, needed centralized management of the HPC clusters to allow data collection from multiple end points, enable cross-departmental research projects and improve forecasts of capacity demand.

### The Solution:

The university switched its IT model from distributed computing managed by individual departments to a centralized cloud computing environment. With the cloud, the university dynamically allocates computing resources across departments to maximize utilization, easily integrates data from multiple end points to support cross-departmental research and gets a comprehensive overview of usage to better forecast future capacity demand across the network.

### What Makes it Smarter:

- Maximizes utilization by dynamically allocating high-performance computing resources among heterogeneous hardware clusters
- Enhances capacity-demand forecasting by providing a comprehensive overview of IT resource usage throughout the cloud environment
- Expands cross-departmental academic research projects by integrating data from multiple end points through a self-service Web portal

*“Cloud computing has transformed our approach to information technology, giving our IT staff new ways to support cross-departmental research and to better understand our university’s future computing needs.”*

— Beijing University

### Solution components:

- IBM® BladeCenter® HS21 servers
- IBM System x® 3650 and System x 3950 M2 servers
- IBM DS4700 Express disk storage
- IBM Tivoli® Monitoring and Tivoli Provisioning Manager software
- IBM Software Services for Tivoli

# Samsung SDS

## Increases the flexibility, visibility and efficiency of its mission-critical billing system

### Business challenge:

The largest global IT solutions provider in Korea needed to upgrade its applications to support and manage its comprehensive billing system. Moving forward, Samsung SDS wanted to adopt a new management solution that could work effectively with the company's complex heterogeneous platforms and disparate software platforms which were supporting the company's mission-critical billing system.

### Solution:

Samsung SDS adopted IBM® Tivoli® Usage and Accounting Manager software to support its comprehensive billing system. The Tivoli Usage and Accounting Manager software is responsible for managing IT-based systems and automatically collect IT usage metrics to create billing data, reports and invoices. Additionally, the Tivoli Usage and Accounting Manager software supports the company's disparate software environment that includes VMWare Collector, Microsoft Windows Process Collector, SAR Collector, VMSTAT Collector, AIX AA Collector, TSM Collector, NetBackup Collector and Networker Collector software solutions.

### Benefits:

- Increased billing flexibility and visibility
- Reduced workload and increase in efficiency

### Solution components:

- IBM® Tivoli® Usage and Accounting Manager



MAM DOC NUMBER



# Why IBM?

## Reduce Cost

Only IBM provides the **breadth and depth of platform coverage** across physical and virtual platforms and comprehensive management and provisioning of application stacks

## Manage Risk

Only IBM can provide **scale and reliability** requirements for the largest infrastructures

## Improve Service

Only IBM provides an **integrated process management** framework for both IT and non-IT assets

## Visibility



## Control



## Automation



## Additional Slides

- For more information visit

[http://www-](http://www-03.ibm.com/systems/itsolutions/virtualization/manage.html)

[03.ibm.com/systems/itsolutions/virtualization/manage.html](http://www-03.ibm.com/systems/itsolutions/virtualization/manage.html)

# Capabilities & benefits of managing the virtual environment

<i>Capabilities</i>	<i>Key Benefits</i>
Virtualization Management	One place to control and configure physical and virtual machines across platforms <b>eases administration</b> and reduces labor costs.
Performance & Availability Monitoring	<b>Proactively respond</b> to performance before services are impacted. Ensure availability of hypervisor managers
Capacity Analysis	<b>Reduce HW &amp; Storage Costs</b> Understand if additional VMs/LPARs can be added to the environment, predict when resources will meet/exceed capacity
Energy Management	<b>Reduce energy costs;</b> Demonstrate effectiveness of energy management initiatives High availability of services – thermal problems/outages (HVAC, etc)
Configuration Management	<b>Easily pinpoint problems</b> due to a configuration change. Understand implications of making a change.
Workload Automation	<b>Improve resiliency</b> of the virtual environment & critical applications & improve transaction processing times.
Security Management	<b>Increases virtual server uptime</b> and availability & reduces security risk

# Integrated Offerings: IBM Systems Director Editions



- IBM provides **new solutions and integrations** to support data center transformation.

- ***New offerings*** designed to:

**Monitor and Repair** system status

**Deploy and Optimize** workloads

**Plan and Document** infrastructure



## IBM® Systems Director Express Edition

- Remotely monitor, configure and update
- Reduce time required for troubleshooting

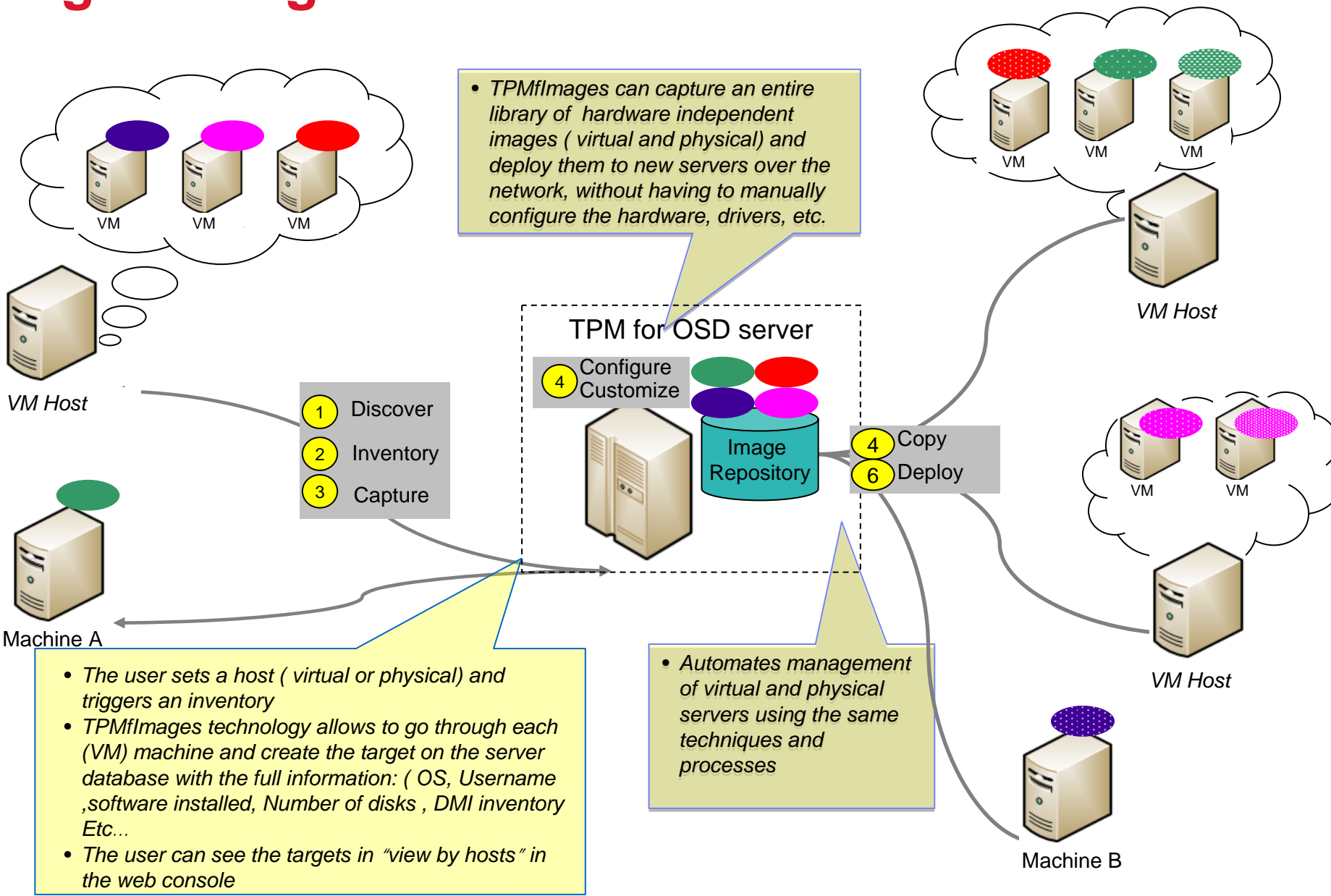
## IBM Systems Director Standard Edition

- Monitor and manage energy use
- Reduce time to deploy virtual images
- Manage networking systems

## IBM Systems Director Enterprise Edition

- Deploy workloads in system pools
- Increase productivity with prioritized information and context
- Generate historical health status reports
- Use predictive capabilities to help with capacity estimation

# Image Management



• TPMfImages can capture an entire library of hardware independent images ( virtual and physical) and deploy them to new servers over the network, without having to manually configure the hardware, drivers, etc.

- 1 Discover
- 2 Inventory
- 3 Capture

TPM for OSD server

- 4 Configure/Customize

Image Repository

- 4 Copy
- 6 Deploy

- The user sets a host ( virtual or physical) and triggers an inventory
- TPMfImages technology allows to go through each (VM) machine and create the target on the server database with the full information: ( OS, Username ,software installed, Number of disks , DMI inventory Etc...
- The user can see the targets in "view by hosts" in the web console

- Automates management of virtual and physical servers using the same techniques and processes

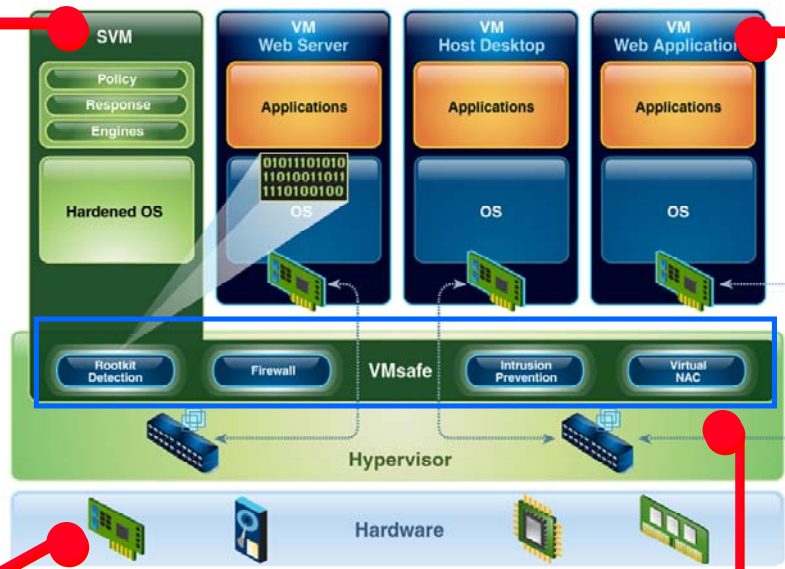
# Virtual Server Security Protects the VMware Virtual Environment

**Management Vulnerabilities**  
Secure storage of VMs and the management data

**IBM Virtual Patch®** technology protects vulnerabilities on virtual servers regardless of patch strategy

**Stealth rootkits in hardware now possible**  
Virtual NICs & Virtual Hardware are targets

**VM rootkit detection** - Virtualization-based rootkits are particularly of concern because they can cause the hypervisor to become exposed to malware that can conceal themselves from traditional security tools. VSS for VMware transparently inspects VMs to detect installation of rootkits.



**Virtual sprawl**  
Dynamic VM state & relocation  
VM stealing

**Virtual network access control** Quarantines or limits network access from a virtual server until VM security posture has been confirmed; provides network-level workload isolation, and Virtual Infrastructure auditing

**Resource sharing**  
Single point of failure  
Reduced visibility & control

**The IBM Proventia® Management SiteProtector™ system** offers a central management point to control security policy, analysis, alerting and reporting

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