IBM

Power Systems Software

Philippe Ceyssens

Power your planet.

Power your planet.

Workload-Optimizing Systems

+

| Management |
| Energy |
| Security |
| Availability |
| Operating Systems |
| Virtualization |

IBM® Systems Software

AIX | i for Business | Linux

AIX® - the future of UNIX

Total integration with i

Scalable Linux® ready for x86 consolidation

Virtualization without Limits
- ✓ Drive over 90% utilization
- ✓ Dynamically scale per demand

PowerVM™

POWER7™ BUILT ON
Power™

Dynamic Energy Optimization
- ✓ 70-90% energy cost reduction
- ✓ EnergyScale™ technologies

Resiliency without Downtime
- ✓ Roadmap to continuous availability
- ✓ High availability systems & scaling

PowerHA™

IBM® Systems Director

Management with Automation
- ✓ VMControl to manage virtualization
- ✓ Automation to reduce task time

Smarter Systems for a Smarter Planet.

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Power Systems Software Announcement Summary

The Future of UNIX
AIX 6 Express Edition for entry servers & workload consolidation. Plus a major new release of AIX 7 to exploit 1024 POWER7 threads, and support AIX 5.2 WPARs*

Total integration with IBM i
A major release IBM i 7.1 features XML in DB2, automatic workload optimization with SSDs, Rational Open Access: RPG Edition and much more…

Scalable Linux Ready for x86 Consolidation
POWER7 support for RHEL 5.5 & 6, SLES 10 & 11 plus PowerVM lx86 performance optimized for x86 server consolidation*

Virtualization without limits
New storage virtualization to simplify provisioning and management of virtual servers, enhanced virtual networking, including dynamic VLAN.*

Management with automation
VMcontrol system pools support for Linux enhances IBM Systems Director virtualization management

Resilience without downtime
New PowerHA SystemMirror Editions for IBM i

*PowerHA SystemMirror for AIX to be tightly integrated with Cluster Aware AIX 7**

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Power Systems Software Edition Strategy

Power Systems Software Editions	Express	Standard	Enterprise
Systems Director	✓	✓	✓
VMControl	✓	✓	✓
PowerHA	Cluster Feature of OS*	✓	✓
IBM i	✓	✓	✓
AIX	✓	✓	✓
PowerVM	✓	✓	✓

* Cluster Aware is a feature of IBM i, Cluster Aware included with AIX 7 (SOD)

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Power is Virtualization <u>without</u> Limits

Consolidate AIX & i databases with Linux application servers

Live Partition Mobility with VM's of any size up to entire system unlike VMware

Drive systems to over 90% utilization for maximum ROI

Integrated storage virtualization for simplified provisioning, management of virtual servers and enhanced virtual networking*

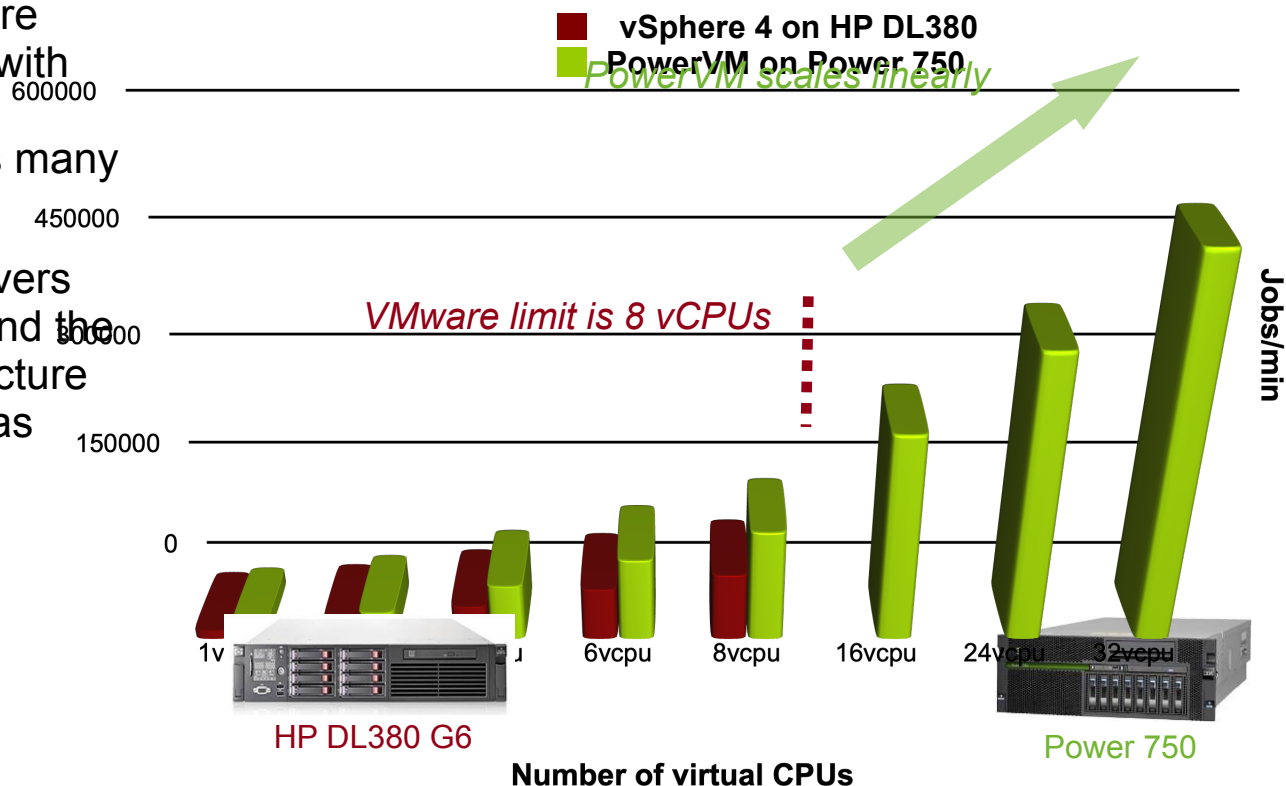Industrial strength virtualization creates a solid foundation for cloud computing

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PowerVM™

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*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Some features require the purchase of additional software components.

PowerVM on POWER7 delivers virtualization without limits with higher performance, more scalability, and higher resource utilization than VMware

65%

PowerVM outperforms VMware by up to 65% on Power 750, with linear scaling that maximizes resource utilization with 4x as many virtual CPUs[1]

And POWER7 enterprise servers with PowerVM scale far beyond the limits imposed by x86 architecture and VMware with up to 32x* as many virtual CPUs

PowerVM™

AIM7 Performance Benchmark
Single VM Scaling (Scale-up)

■ vSphere 4 on HP DL380
■ PowerVM on Power 750

PowerVM scales linearly

VMware limit is 8 vCPUs

600000
450000
300000
150000
0

Jobs/min

1vcpu   6vcpu   8vcpu   16vcpu   24vcpu   32vcpu

HP DL380 G6   Power 750

Number of virtual CPUs

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The future of UNIX

AIX 6 Editions for entry to enterprise servers & workload consolidation
AIX 7* to exploit 1024 POWER7 threads, and support AIX 5.2 WPARs

Total integration with i

IBM i 7.1 features XML in DB2, automatic workload optimization with SSDs, Rational Open Access: RPG Edition and much more

Scalable Linux ready for x86 consolidation

POWER7 support for RHEL 5.5 & 6*, SLES 10 & 11 plus PowerVM Lx86 performance optimized for x86 server consolidation

All 3 operating environments available with POWER7

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POWER7 OS Software Support

- **AIX 5.3** with the 5300-11 Technology Level and SP2, or later

- **AIX 6.1** with the 6100-04 Technology Level and SP3, or later

- **IBM i 6.1** with 6.1.1 machine code, or later

- SUSE Linux Enterprise Server 10 with SP3 for POWER

- SUSE Linux Enterprise Server 11 for POWER, or later

- RHEL 5.5 or 6 (SoD)

- VIOS 2.1.2.12 with Fix Pack 22.1 and Service Pack 2, or later

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New Choice and Flexibility with AIX 6 Editions
Mix and match editions on the same server to meet your needs

Express Edition

✓ Ideally suited for entry servers and consolidation of smaller workloads onto larger servers

✓ Vertical scalability up to 4 cores per virtual machine, 8GB of memory per core

Standard Edition

✓ Industry leading UNIX suitable for the most demanding workloads

✓ Vertical scalability up to 64 cores, unlimited memory per core

Enterprise Edition

✓ Industry leading UNIX plus leadership enterprise management

✓ Includes Systems Director Enterprise Edition and the Workload Partitions Manager for AIX

✓ Vertical scalability up to 256 cores*

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AIX 6 Express Edition

- AN edition of AIX priced for smaller workloads
  - AIX 6 and 7 will feature Express Edition
  - AIX 5.3 will <u>not</u> feature Express Edition

- Intended for two deployment situations
  1. Entry price on entry servers and blades
  2. Consolidation of smaller workloads on enterprise servers

- AIX 6 Express Edition terms are designed for small workloads
  - Vertical scalability limited to 4 core maximum partition size
  - 8 GB memory per core maximum

- Flexibility to optimize for multiple workloads
  - Run any combination of AIX Editions on a server

Capability

AIX Express Edition

AIX Standard Edition

AIX Enterprise Edition

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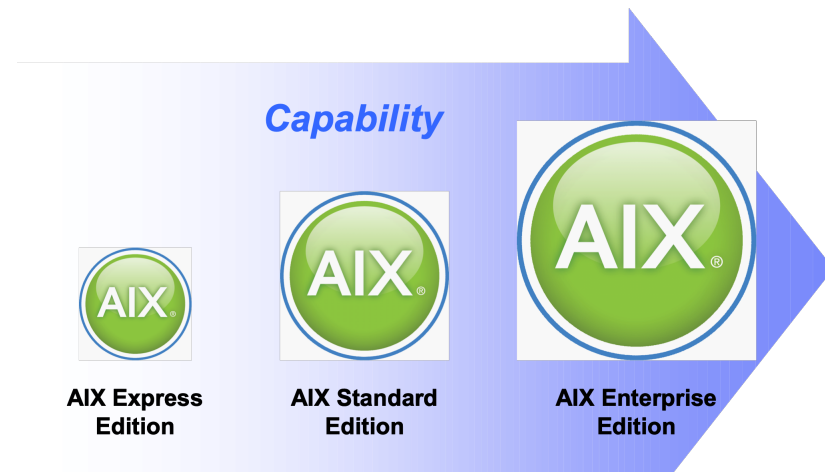
IBM License Metric Tool

- Common IBM monitoring tool for SWG, Power Systems & Systems Director software products
- Provides a data center view of IBM software licenses
- Simplifies customer license tracking, compliance & audit reporting
- ILMT does NOT report back to IBM

- Tool Provides*:
  - Software inventory
  - Web-based administration
  - Standard & custom license reports
  - Audit reports
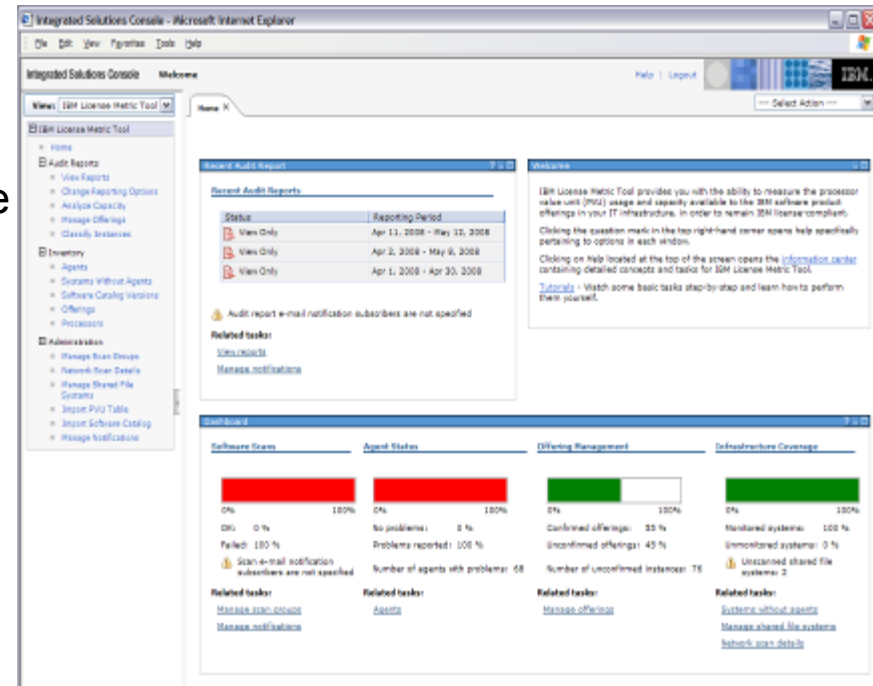
Required for clients using AIX Express Edition on Medium and Large servers

*Implementation of some features will be staged over time

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AIX Enterprise Edition Key Features

- **Live Application Mobility**
  - Relocate Workload Partitions between systems with almost no client impact
- **Energy Management**
  - Collecting and report current and historical usage, and controlling energy usage
- **Virtual Server Management**
  - Create and manage virtual machines, manage virtual machine relocation, and managing virtual workloads in system pools
- **Manage WPARs across multiple systems**
  - Centralize the creation, replication, and starting of WPARs across multiple systems
- **Automatically discover IT components and their relationships**
  - Ideal for managing dynamic virtualized environments
- **Monitor virtualized resources**
  - Efficient management begins with comprehensive performance information
- **Predictive monitoring and capacity management**
  - Leverage real time monitoring in data warehouse to provide advanced analytics for capacity planning and proactive monitoring
- **Provides a visual representation of the components**
  - Assists understanding of complex application dependencies
- **Network Management**
  - Discover, monitor, and manage multi-vendor network devices and automate network management tasks
- **Monitor utilization and configuration changes**
  - Useful for problem determination and failure analysis

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The Future of UNIX: AIX 7*

Vertical scalability for massive workloads with up to 256 cores/ 1024 threads in a single AIX partition

Consolidation of legacy environments onto POWER7 with support for AIX 5.2 in WPARs

Built in clustering to simplify configuration and management of scale-out workloads and high availability solutions

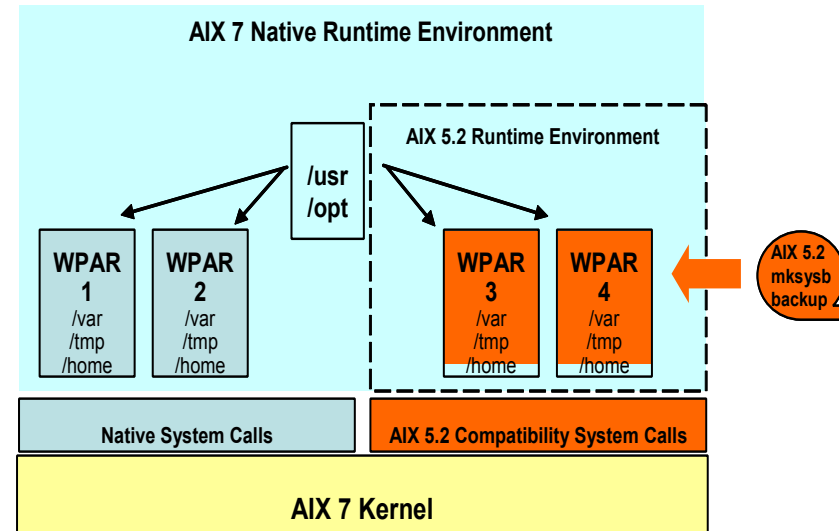Simplified management of pools of AIX systems with profile based configuration management

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AIX 5.2 WPARs for AIX 7

New offering that enables consolidation of existing AIX 5.2 environments inside of an AIX 7 Workload Partition on POWER7

- **Customer Value**
  - *Minimize effort to consolidate old environments on new, more efficient hardware*
  - *Allows clients who must stay on AIX V5.2 to move up to POWER7*

- **Features**
  - *Allows a legacy AIX 5.2 environment to be run inside a WPAR on POWER7 processor-based systems with AIX 7*
  - *Simply back up existing environment and restore inside of an AIX 7 WPAR*
  - *This offering will also provide how-to and limited defect support for the AIX 5.2 operating system*
  - Managed via IBM Systems Director Workload Partitions Manager

AIX 7 Native Runtime Environment

AIX 5.2 Runtime Environment

/usr
/opt

WPAR 1 /var /tmp /home
WPAR 2 /var /tmp /home
WPAR 3 /var /tmp /home
WPAR 4 /var /tmp /home

AIX 5.2 mksysb backup

Native System Calls

AIX 5.2 Compatibility System Calls

AIX 7 Kernel

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Cluster Aware AIX

Designed to simplify construction and management of clusters of AIX systems for scale-out computing and high availability

- Easily create clusters of AIX instances for scale-out computing or high availability

- Designed to:
  - Significantly simplify cluster configuration, construction, and maintenance
  - Designed to improve availability by reducing the time to discover failures
  - Capabilities such as common device naming help simplify administration
  - Built in event management and monitoring

- A foundation for future AIX capabilities and the next generation of PowerHA SystemMirror

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AIX 7 Profile Manager

Providing simplified discovery, application, update, and verification of AIX configuration properties across multiple systems

Old Way
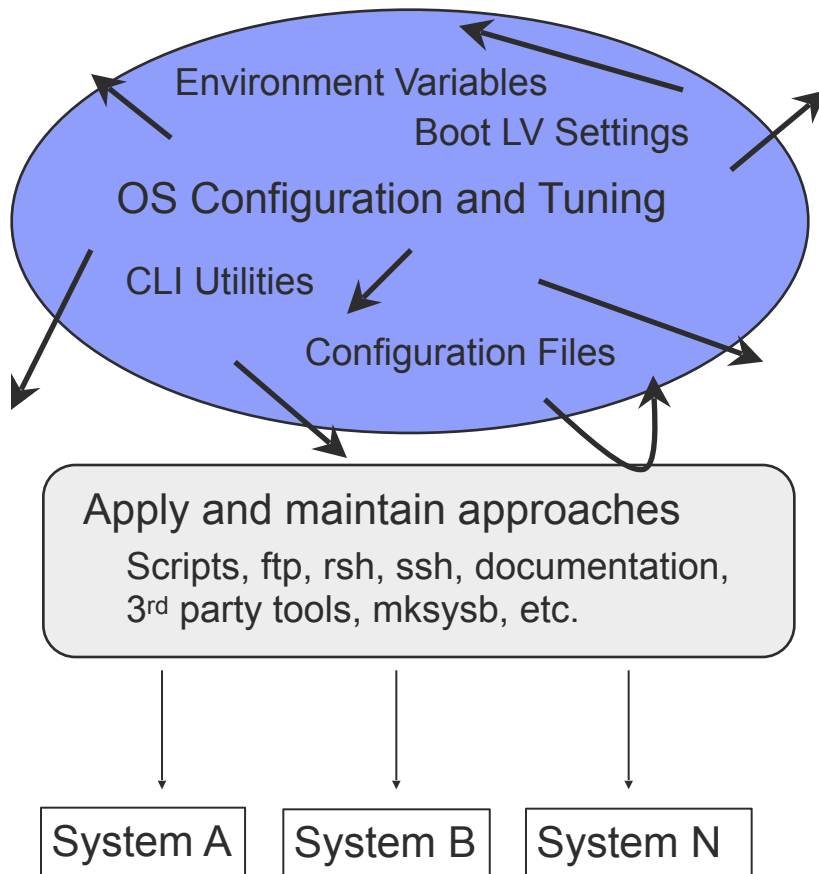
Using the AIX Profile Manager for configuration
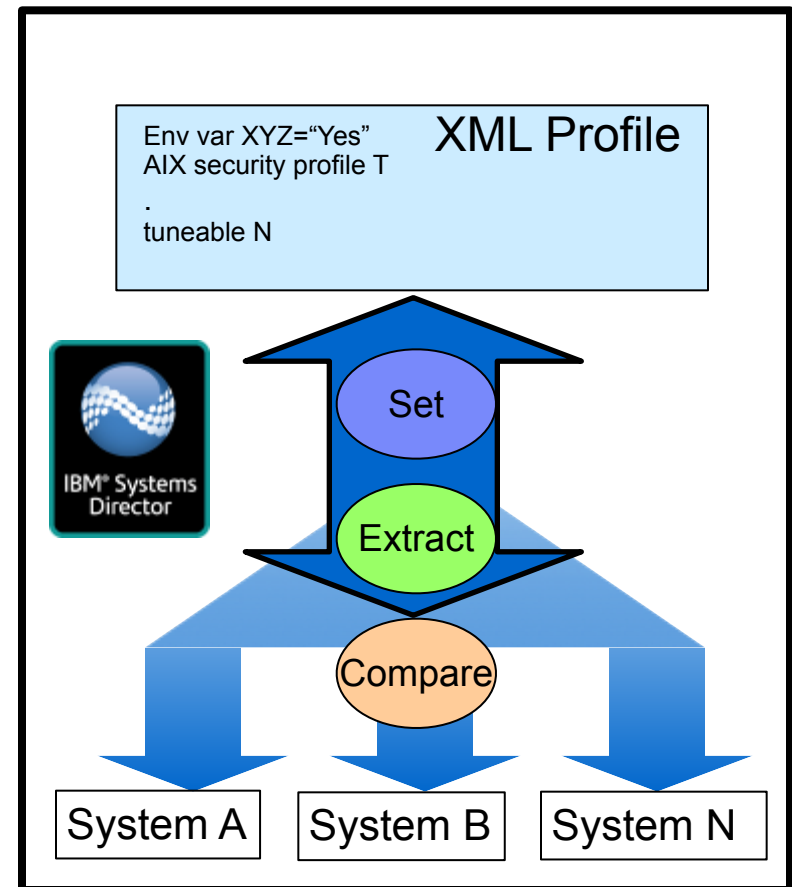
Environment Variables

Boot LV Settings

OS Configuration and Tuning

CLI Utilities

Configuration Files

Apply and maintain approaches

Scripts, ftp, rsh, ssh, documentation, 3rd party tools, mksysb, etc.

System A   System B   System N

Env var XYZ="Yes"
AIX security profile T
.
tuneable N

XML Profile

IBM® Systems Director

Set

Extract

Compare

System A   System B   System N

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AIX Version 5.3 End of Marketing Announcement

- Announce withdrawal of marketing for AIX 5.3 effective April 2011
- Goal is to give customers advance notice for planning and an additional incentive to move up to AIX 6 or consider move to AIX 7

AIX 5.3

GA 8/04

EOM 4/11

EOM Announced 4/10

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What Linux distributions will be supported with POWER7

- SUSE Linux Enterprise Server 11

- SUSE Linux Enterprise Server 10 SP3

- Red Hat Enterprise Linux 5.5

- SOD: Roadmap to RHEL 6 (outlook 3Q2010)

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Resiliency Without Downtime -- PowerHA

High availability solutions for UNIX, and i clients
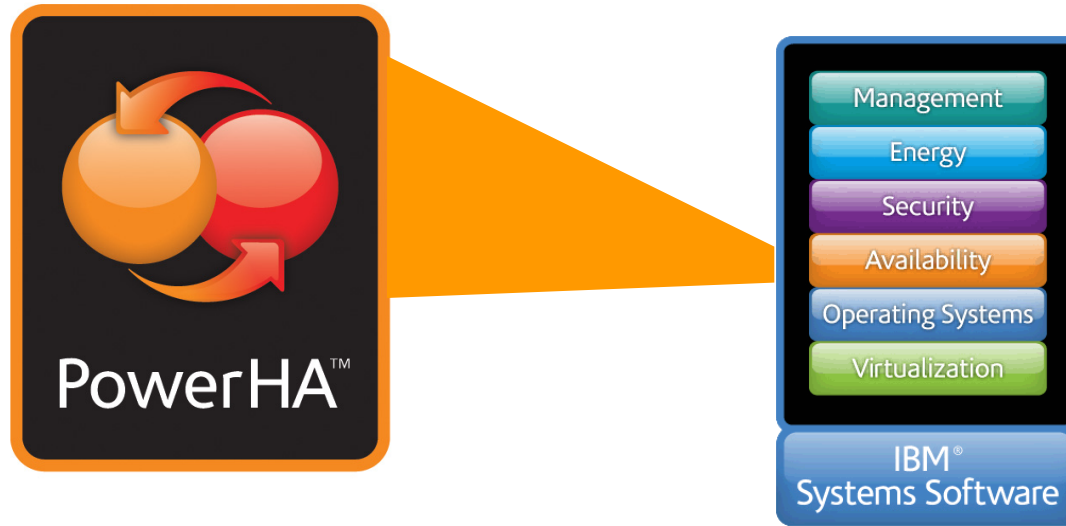
- Cluster management solutions for high availability
  - Can enable near continuous application service
  - Minimize impact of planned and unplanned outages
- PowerHA™ SystemMirror for AIX®
- PowerHA SystemMirror for i
- PowerHA pureScale

www.ibm.com/systems/power/software/availability

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PowerHA SystemMirror Strategy
Simplification – Usability- Reliability

- **Solution Package Optimization & Standardization**
  - Standard Edition
  - Enterprise Edition
- **Deep Integration with AIX and/or IBM i**
  - Cluster Aware AIX (7.1)
  - Cluster Aware i (HASR)
- **Ease of use**
  - Smart defaults, graphical interfaces
- **Storage Integration & Disaster Recovery**
  - Extend PowerHA storage support
- **Middleware optimization**
  - Out of the box HA agents for popular AIX middleware environments
  - IASP enabled commercial applications for IBM i
- **Virtualization**
  - Exploit and align with Power Systems platform virtualization
- **Cluster wide resource management**
  - Single point of control

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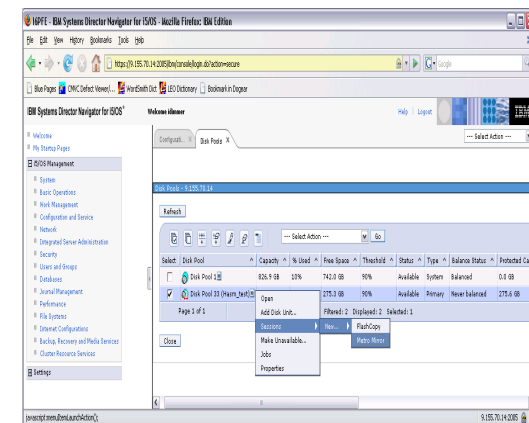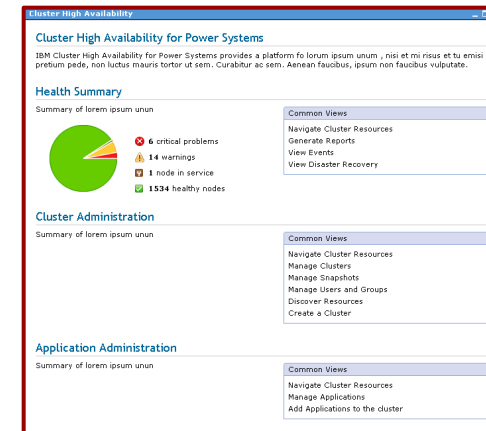
PowerHA SystemMirror 7.1 for AIX*

Integrated high availability with cluster aware AIX providing kernel based monitoring, cluster wide: event management, AIX command interface, device naming and storage device management

Simplified management with new IBM Systems Director based GUI interface

Enterprise Edition extends options for multi-site storage resiliency including 6.1 IBM DS8000® Metro Mirror, SVC Metro Mirror & Global Mirror, EMC SRDF V6.1. PowerHA EE 7.1 adds support for Hitachi Truecopy and IBM DS8000® Global Mirror

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Power is Resiliency without Downtime

PowerHA® SystemMirror Editions for AIX and i provide active/ standby datacenter and multi-site disk clustering solutions for resiliency. Tight integration with cluster aware AIX 7*

PowerHA pureScale provides active/active high performance data transfer, cluster coordination, and centralized locking and is built-into DB2 pureScale

PowerVM Live Partition Mobility enables planned system downtime without application downtime

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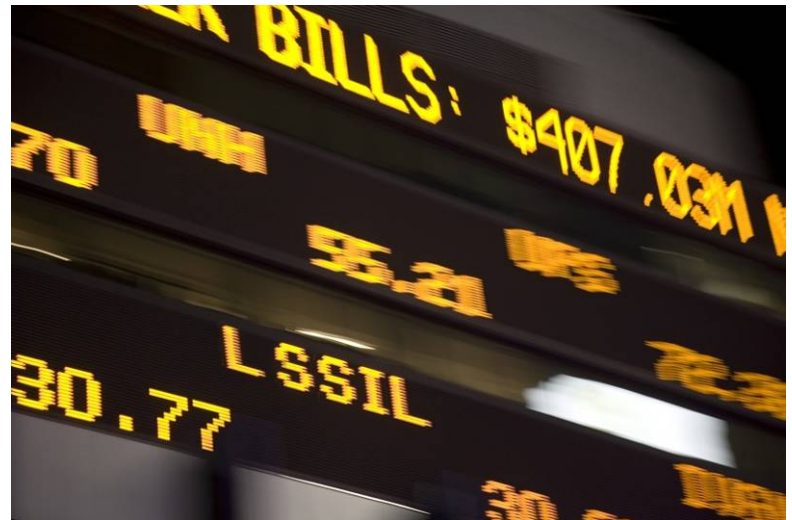
Power is Dynamic Energy Optimization

POWER7 delivers up to 3 - 4X the performance with less energy than POWER6

Increased consolidation drives higher utilization and more energy savings

EnergyScale™ intelligently and dynamically optimizes performance for energy efficiency

IBM Systems Director Active Energy Manager™ helps lower energy usage per system and across systems

Management
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See POWER7 3x-4x more energy efficient than POWER6 for more details
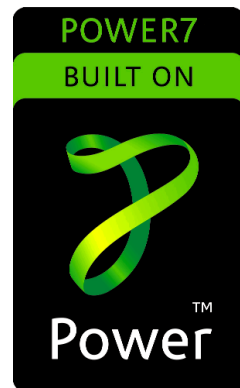
Power is Management with Automation

Physical assets & virtual resources at your fingertips with easy health monitoring & reporting, as well as updates & optimization

VMControl™ for automation of virtualization management to minimize time to provision images and manage system pools

Server and virtualization management integrated with network and storage management for complete resource control

Easy integration with enterprise service management tools from Tivoli as well as other third party providers

Management
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IBM® Systems Director
Simplifying the management of multi-system environments

- *Common toolset for managing physical and virtual resources –servers, storage and networking*
- *Automates data center operations to proactively avoid problems*
- *Reduces burden of time consuming administrative tasks*

- *Simplified deployment, installation and update process*
- *Integrates with IBM service management offerings from IBM Tivoli*

Simplified management
of physical and virtual infrastructure

Rapid deployment and
optimization of IT resources

Reduction in
time-consuming management tasks

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Systems Director helps to . . .

- Find and identify systems on the network
- Determine if systems are working properly
- Configure and deploys new systems
- Optimize systems for peak performance
- Monitor network devices
- Deploy virtual images
- Reduce time to execute systems administrative tasks

- Keep system firmware and drivers up to date
- Manage Energy
- Improve System Availability
- Manage multiple systems as a single entity
- Reduce virtualization complexity
- Automated discovery and topology views to simplify troubleshooting

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Systems Director Editions for integrated service management

Express Edition
✓ View the relationships between systems
✓ Manage virtual machines across multiple hypervisors
✓ Remotely access system status and updates

Standard Edition
✓ Reduce time to deploy virtual AIX and Linux workloads
✓ Monitor and control energy use
✓ Monitor and configure networking systems

Enterprise Edition
✓ Automate workload deployment in system pools of AIX and Linux virtual machines
✓ Analyze real-time and historical status
✓ Analyze predictive resource capacity data

IBM® Systems Director

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Systems Director Express

Challenges

- Inability to effectively perform basic monitoring, and updates across physical and virtual servers

Requirements

- Quick and easy way to deploy firmware patches, receive notifications of hardware component failures, disk and CPU thresholds and OS patch levels

Benefits

- A single dashboard to effectively visualize and communicate the relationships of physical and virtual systems

- Monitor health of systems

- Troubleshoot and fix problems

- Reduced administration time and costs

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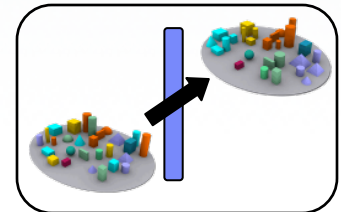
Systems Director Standard

Challenges
- High costs of server sprawl, (hardware, software licenses, administration. Consolidation, then Virtualization

Requirements
- Quickly and easily manage and deploy virtual machines and images to meet changing workload demands across multiple servers
- Monitor and manage dependencies between physical and virtual servers, storage, networks and energy usage for advanced troubleshooting
- Hardware maintenance and management

Benefits

- Advanced deployment

- Monitoring and control features across physical and virtual servers, storage, networking and energy facilities

- Improved ability to quickly adapt to changing workload and energy requirements

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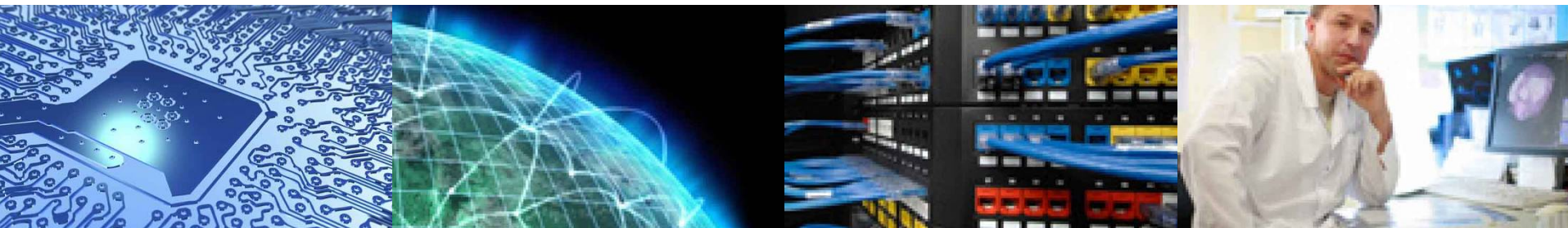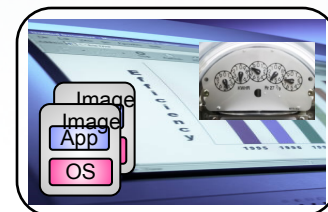
Systems Director Enterprise

Challenges

- Lack of agility to respond to business needs and high costs of computing due to inefficient use of server resources

- High administrative costs due to complexity associated with inconsistent management tools across all server platforms

Requirements

- End to End performance, availability and energy usage monitoring

- Improved utilization of server resources through effective capacity reporting and planning

Benefits

- Comprehensive information for troubleshooting and predictive capacity planning, potentially resulting in deferred hardware acquisitions

- Leadership energy management allowing for increased compute power within the same energy envelope

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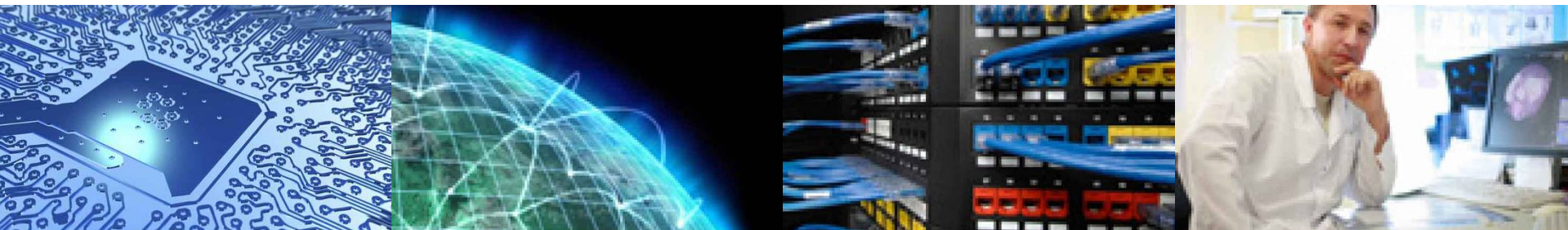
VMControl Editions v2.3: Virtualization Management for Linux on Power

VMControl	**VMControl Express Edition**	**VMControl Standard Edition**	**VMControl Enterprise Edition**
Virtualization Capabilities	**Manage** VMs	**Automate** virtual images	**Optimize** system pools
PowerVM	AIX i for Business Linux	AIX Linux	AIX Linux
Create/manage virtual machines (x86, PowerVM and z/VM)	✓	✓	✓
VM relocation (AIX and Linux)	✓	✓	✓
Capture/import, create/remove standardized virtual images		✓	✓
Maintain virtual images in a centralized library		✓	✓
Create/remove system pools and manage system pool resources			✓
Add/remove physical servers within system pools			✓

VMControl V2.3 delivers comprehensive virtualization management for Linux on Power virtual workloads, including image management and system pools capabilities

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VMControl™ Express Edition
Management of virtualized resources

- **Multi-platform management**
  - View virtual and physical assets
  - Virtualized life-cycle management
  - Topology maps

- **Edit virtual resources**
  - Edit physical hosts
  - Edit virtual machines
  - Use GUI or command line

- **Relocate virtual machines**
  - Execute live relocation
  - Plan for relocation

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VMControl™ Standard Edition

Automation through shared libraries of standardized virtual appliances

Import

Open Virtualization Format (OVF)

Deploy Virtual Machines

Capture Virtual Machines
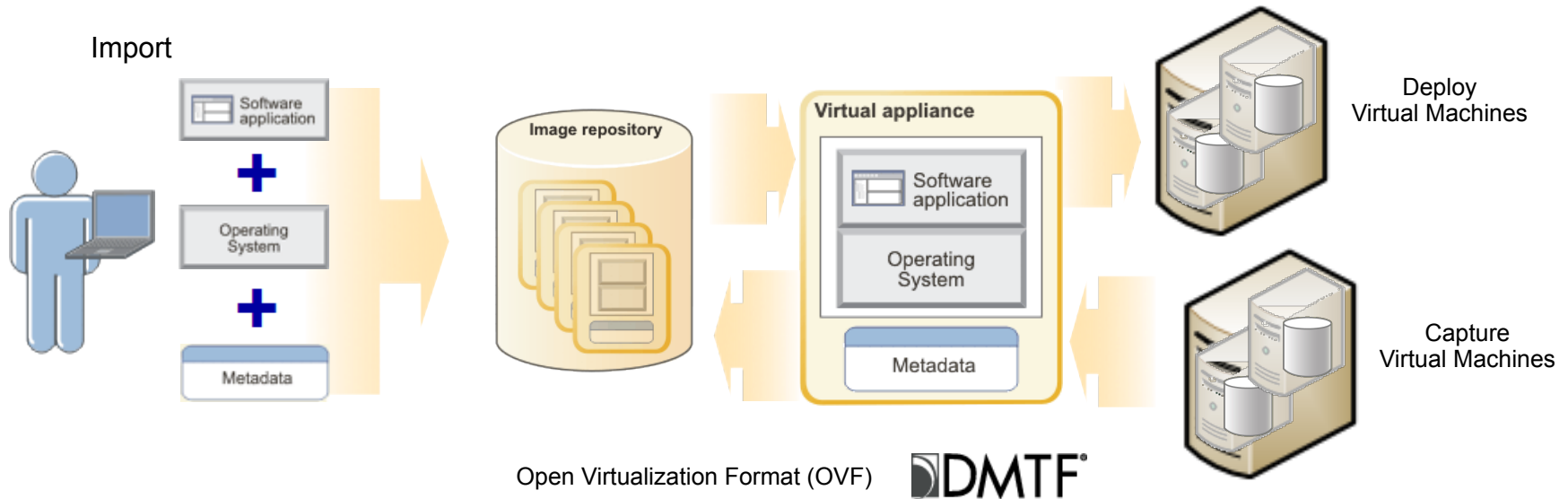
- Discovery and manage heterogeneous image repositories
- Import, capture and catalog new virtual images from existing systems
- Simplified virtual image deployment and customization
- Dynamically provision virtual server, storage and network resource
- Leverages OVF open standard packaging for interoperability

VMControl enables the delivery and management of open standard virtual machine images on IBM Systems

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VMControl™ Enterprise Edition introduces the concept of system pools for higher-level management

- Combines multiple virtual resources into one manageable entity
- Automates virtual image mobility for optimal utilization and resilience
- Optimizes virtual assets for performance, availability and energy use
- Integrates server, storage and network virtualization

Mobility

Optimized for
- Availability
- Performance
- Energy
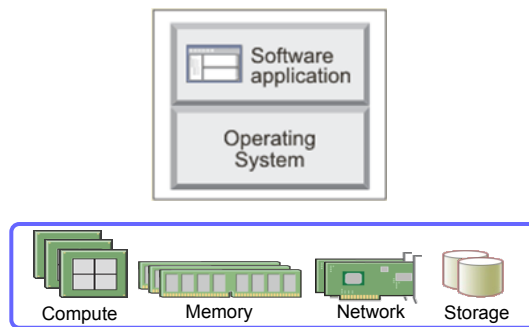
IT Resources
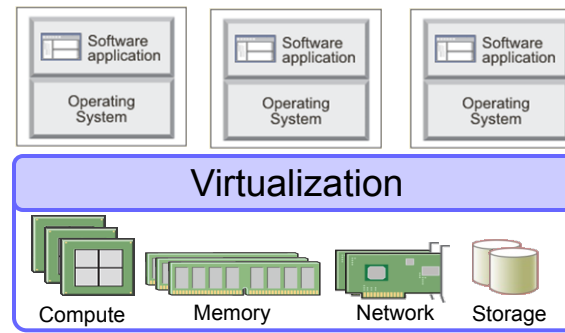
Virtual Images

System Pools

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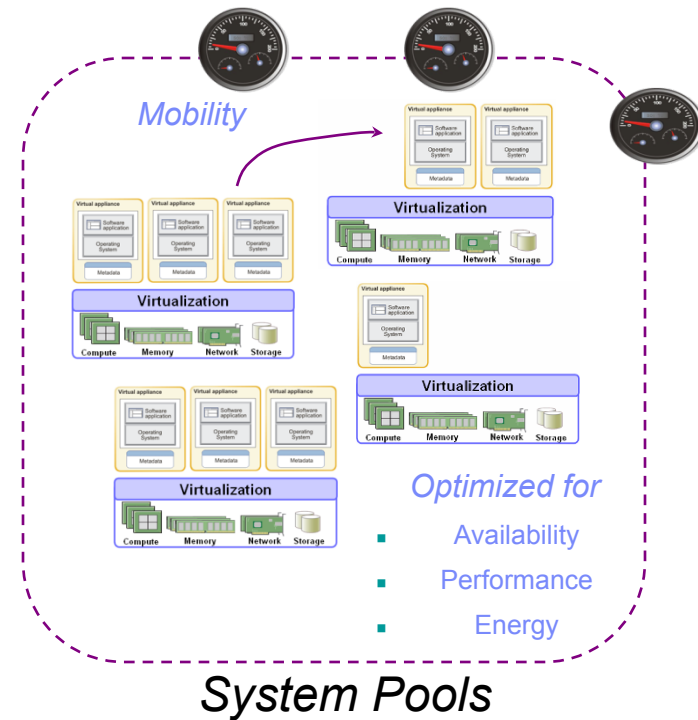
Which Systems Director Edition is right for you?

- **Systems Director Express Edition if you:**
  - Need to know the relationships between systems
  - Manage VMs using multiple consoles
  - Need remote access for system status and updates
  - Are managing more than a few servers

- **Systems Director Standard Edition if you:**
  - Need to speed up deployment of workloads
  - Need to control energy use and costs
  - Use PowerVM Standard Edition

- **Systems Director Enterprise Edition if you:**
  - Need automated resource set-up for workloads
  - Need end-to-end root cause analysis and reporting
  - Need better resource capacity analysis
  - Use PowerVM Enterprise Edition or Tivoli software

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