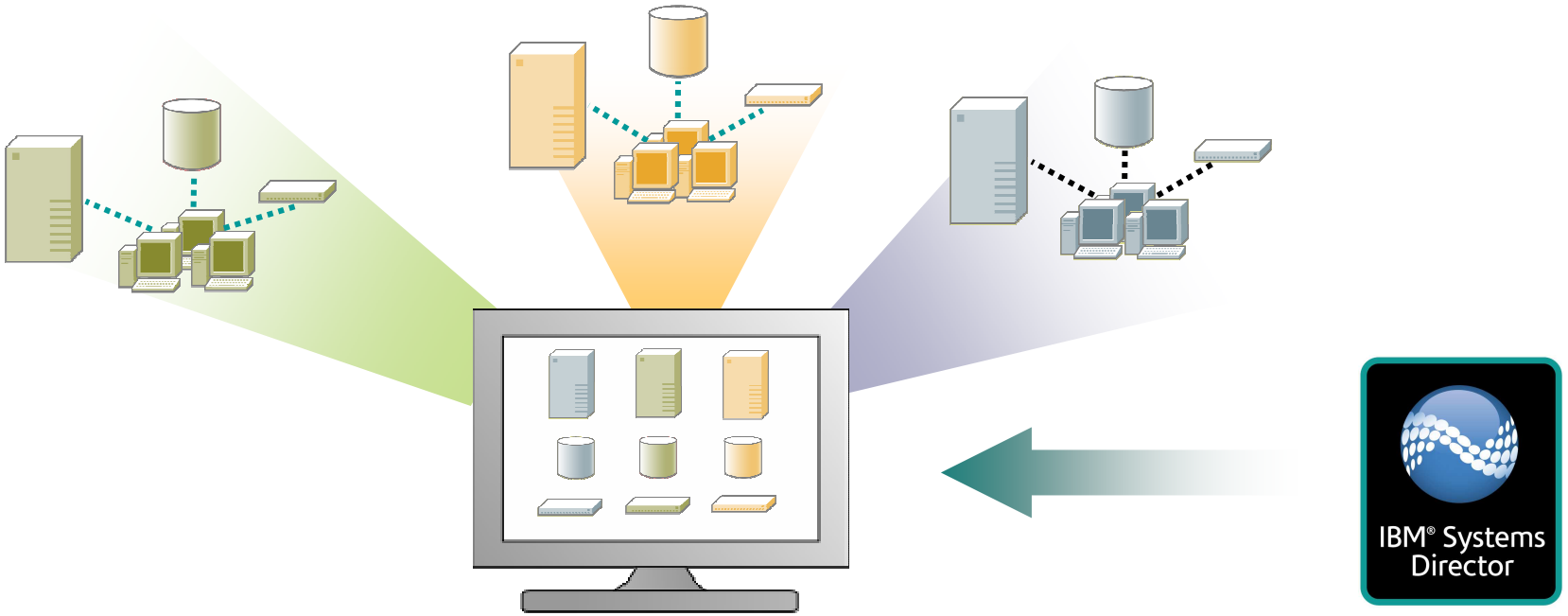
IBM Power Systems
April 2010

IBM Systems Director VMControl

The next generation of virtualization management

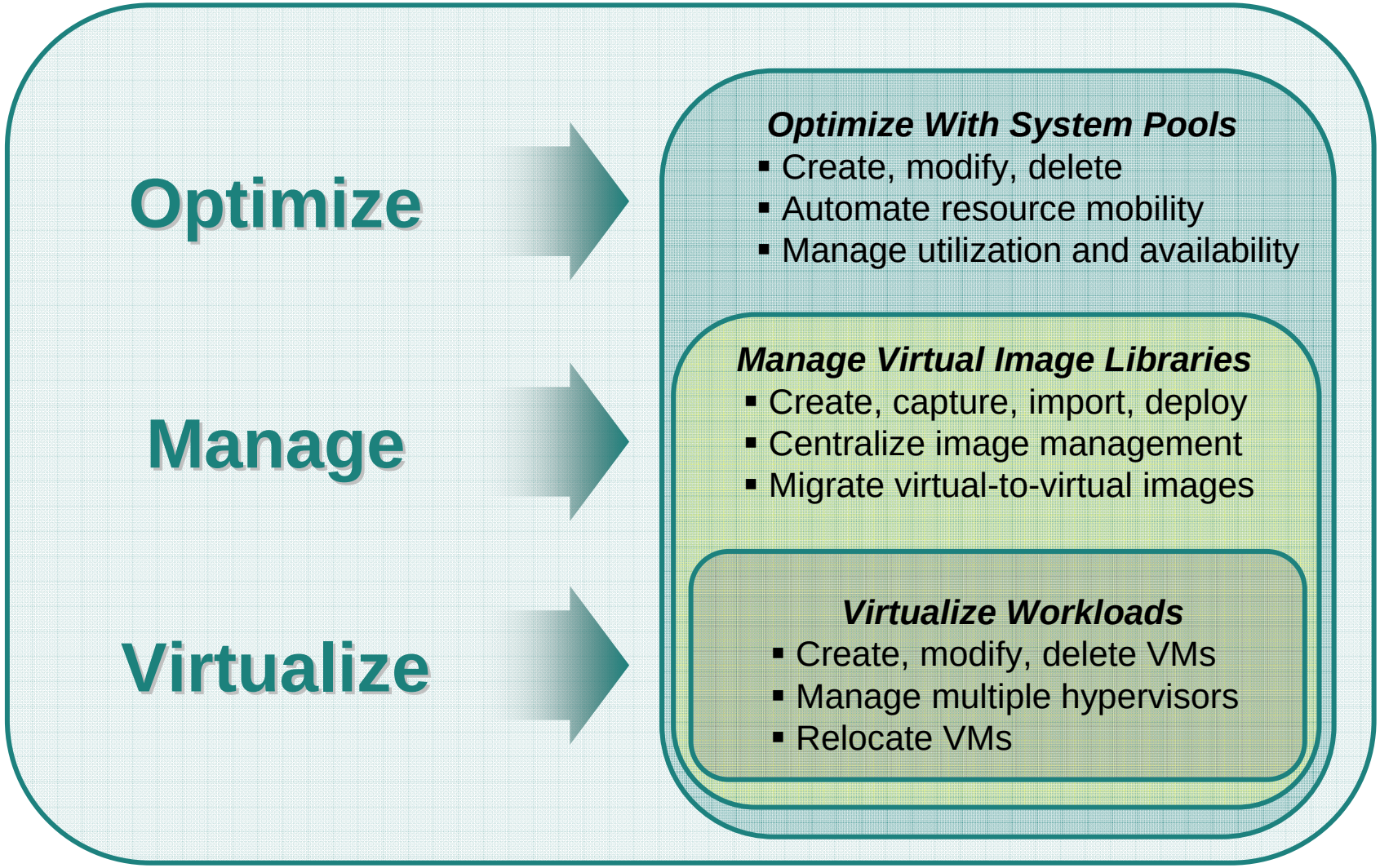
The New Power Equation

Solution: VMControl Unifies Virtualization Management



- Introducing **IBM Systems Director VMControl**
- Enables consistent multi-platform virtualization management for IBM Systems
  - Manages Power Systems, System z®, System x®, storage and network resources
  - Integrates management of virtual servers, appliances, storage, networks and clouds
- Provides seamless integration with Tivoli enterprise service management solutions

Management Needs Change as Virtualization Evolves



IBM Systems Director Terminology

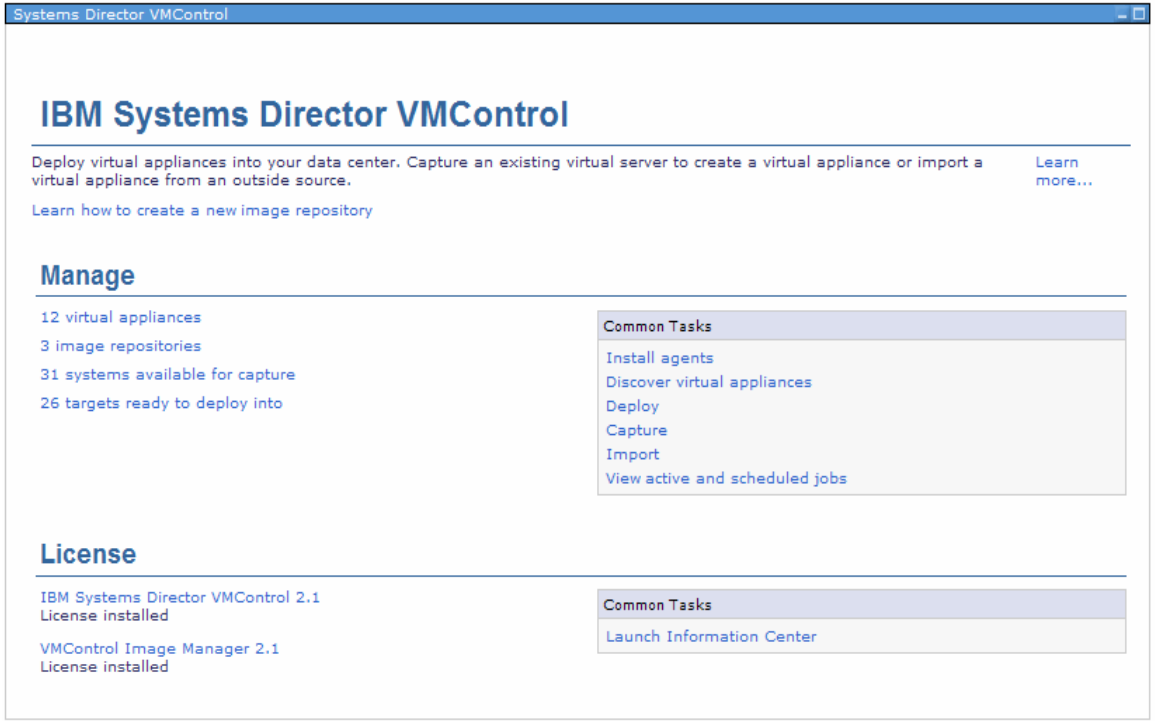
IBM Systems Director term	Power Systems term or concept	Definition
host	server, system, managed system	A physical server that contains physical processors, memory, and I/O resources and which is often virtualized into virtual servers, also known as logical partitions.
virtual server	logical partition, partition	The collection of processor, memory and I/O resources defined to run an operating system and its applications.
utility virtual server	Virtual I/O Server (VIOS)	A virtual server that provide virtualization capabilities for a particular environment.
platform manager	Hardware Management Console (HMC) and Integrated Virtualization Manager (IVM)	A platform manager manages one or more hosts and their associated virtual servers and operating systems. For Power Systems, the platform managers are HMC and IVM.
power on	activate (partition)	Power Systems managed by HMC and IVM, use the term *power on* with respect to a physical server or host. IBM Systems Director uses the same term, *power on*, for virtual servers, where Power Systems has used the term *activate*.
power off	shut down (partition)	Power Systems managed by HMC and IVM, use the term *power off* with respect to a physical server or host. IBM Systems Director uses the same term, *power off*, for virtual servers, where Power Systems has used the term *shut down*.
live relocation	partition mobility, Live Partition Mobility	Moving a running virtual server from one host to another.
static relocation	inactive partition mobility, inactive mobility	Moving a virtual server that is powered off from one host to another.
virtual farm	n/a	A virtual farm logically groups like hosts and facilitates the relocation task. This is a new term for Power Systems users.

VMControl Express Edition

Consistent management of virtualized resources

A plug-in option for IBM Systems Director (available for no additional charge) to **enhance virtualization management** and **simplify** virtual appliance **deployment** across heterogeneous platforms

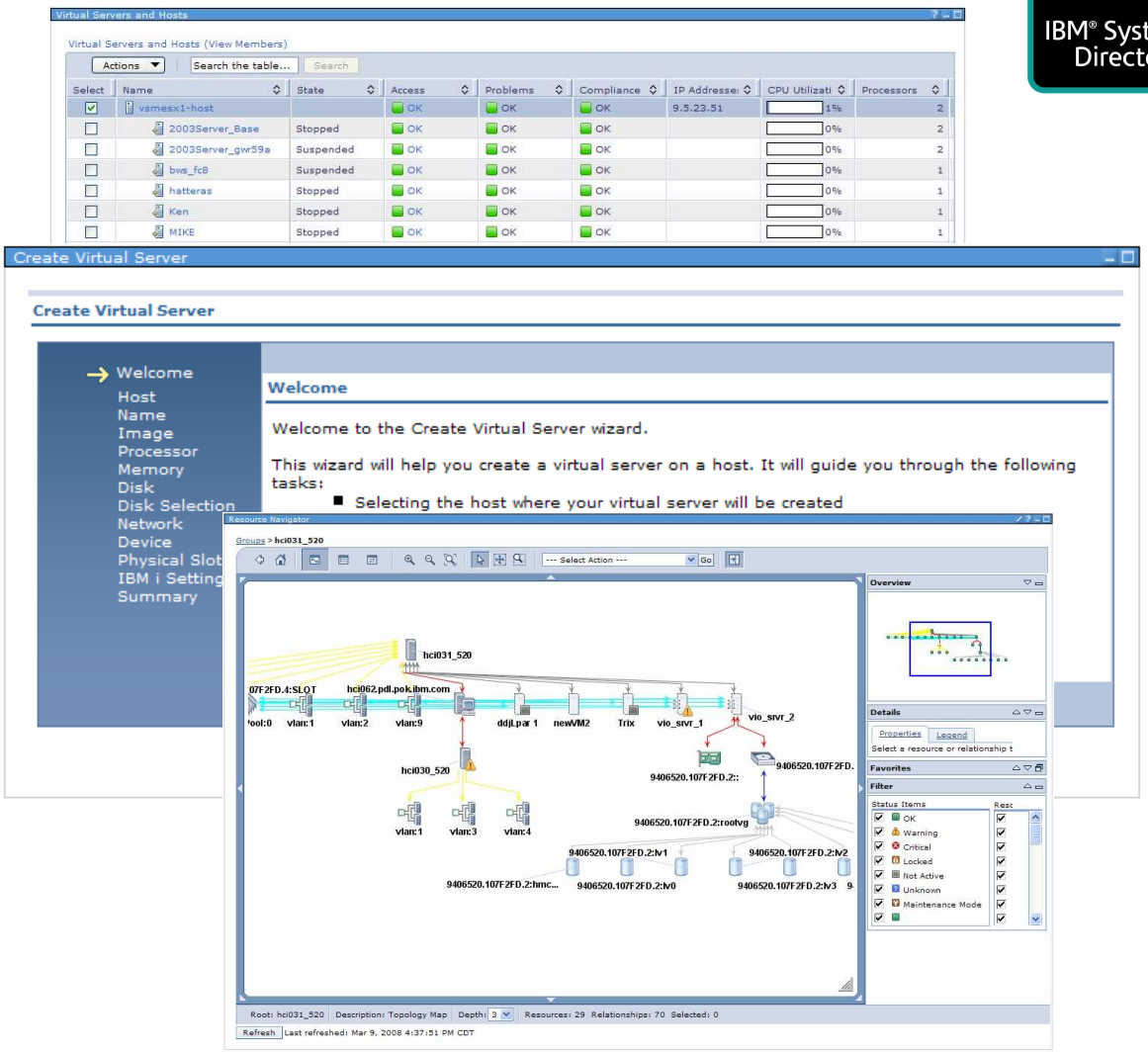
- Deploy virtual machines (VMs) on System x (VMware, Hyper-V or Xen formats), Power Systems (PowerVM) or System z (z/VM)
- Delete VMs to counteract 'virtual server sprawl'
- Configure, edit and maintain VMs
- Monitor VM activity, resource utilization and workload health



VMControl Express Edition

Management of virtualized resources

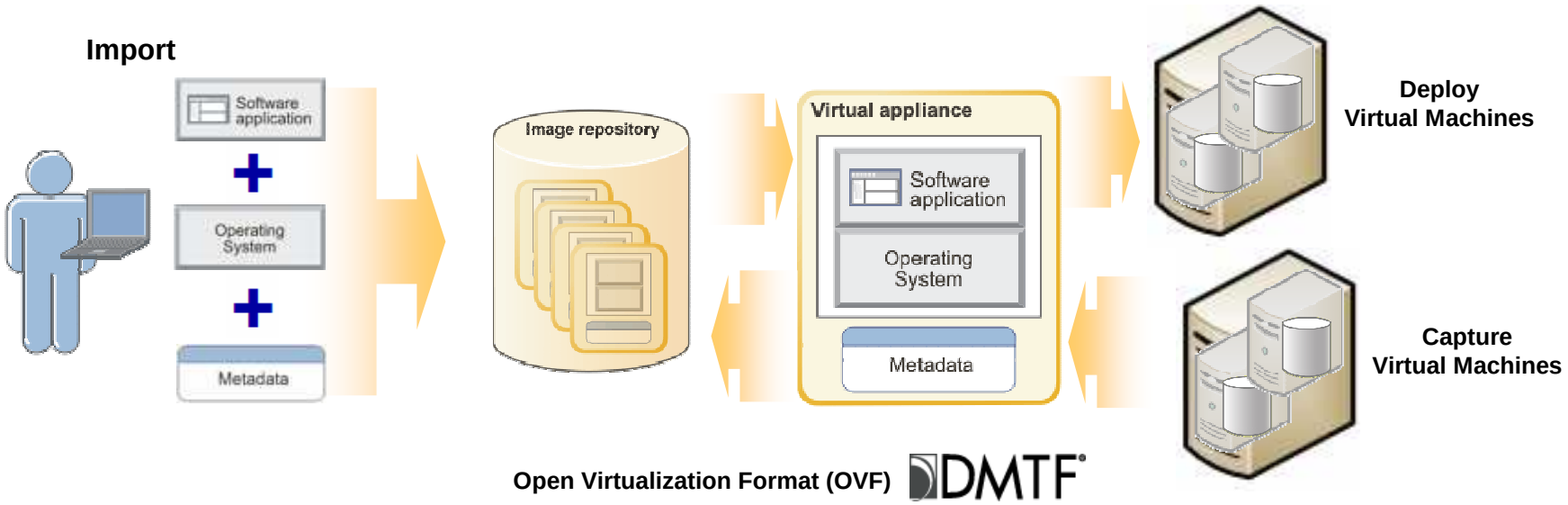
- Multi-platform management
  - View virtual and physical assets
  - Virtualized life-cycle management
  - Topology maps
- Edit virtual resources
  - Edit physical hosts
  - Edit virtual machines
  - Use GUI or command line
- Relocate virtual machines
  - Execute live relocation
  - Plan for relocation



The New Power Equation

VMControl Standard (Image Management) Edition

A complete management solution for libraries of virtual appliances



- 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 Standard Edition

Image management based on open standards

- OVF standardizes a virtual machine image structure and packaging format
  - The Open Virtualization Format is standardized within the DMTF.
  - Allows complex software solutions to be defined as compositions of virtual machine images.
  - IBM's collaboration with other industry leaders has driven the OVF standard.

- A Virtual Machine Image is a Virtual Appliance
  - Simplifies delivery and deployment of complex software systems
  - Provides pre-installed, pre-configured and tested software stack
    - Operating systems, middleware and application software
  - The entire software solution is managed (deployed, updated, etc.) as a unit
    - Removes the need to deal with problematic dependency management

Appliance Simplicity for Complex Software Solutions

- Virtual machine images enable the delivery of SaaS and cloud computing
  - IBM software is being delivered as virtual appliances (e.g. WebSphere Cloudburst)
  - Many vendors are forming ecosystems around standardized virtual machine images

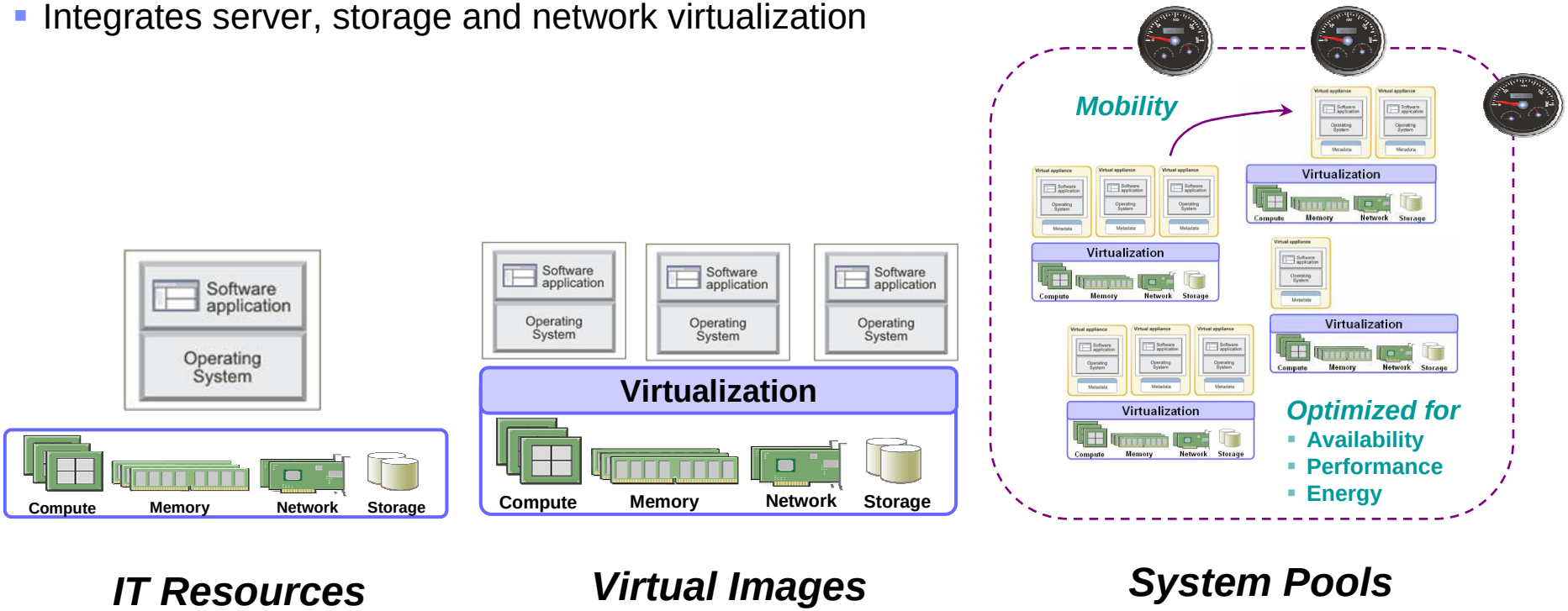
IBM® Systems Director

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

VMControl Enterprise (System Pools) Edition

Introduces concept of system pools for higher-level management

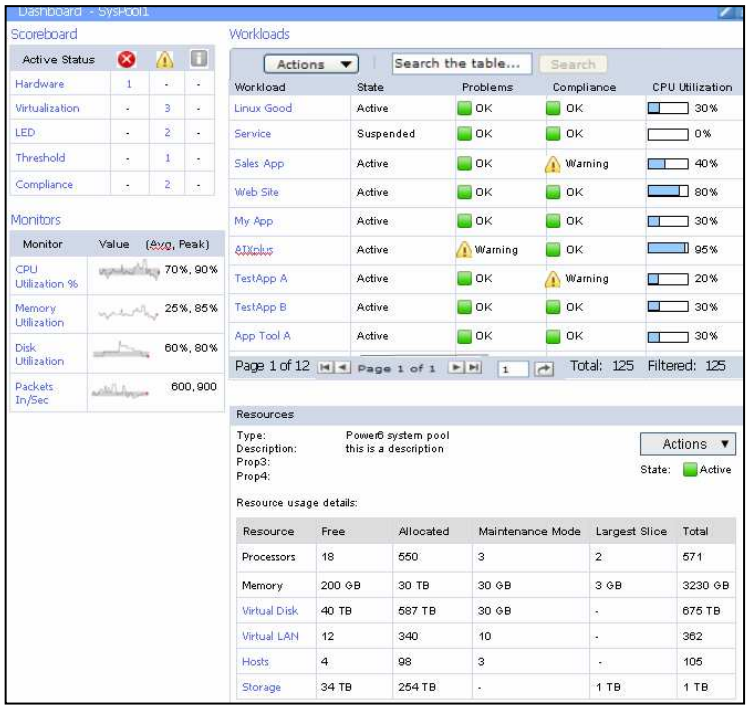
- Combines multiple virtual resources into one manageable entity
- Automates virtual image mobility for optimal utilization and resilience
- Optimizes virtual assets for performance, availability and energy use
- Integrates server, storage and network virtualization



VMControl Enterprise Edition

Lifecycle management for system pools

- **Relocate virtual workloads within the system pool**
  - Determine best host placement within the pool
  - Supports single virtual images and host evacuation
- **Move virtual workloads away from a failing host**
  - Automate relocation of virtual workloads in response to predicted host system failures without disruption
- **Restart virtual workloads when a host fails**
  - Automate remote restart of virtual workloads in response to host failures with minimal disruption
- **Resilience policy associated with the workload**
  - Enables host system monitoring for failures and predictive failures and automates recovery action
- **Automation policy associated with workloads**
  - **Advise** – VMControl recommends actions and requires confirmation
  - **Automate** – VMControl automates actions



VMControl Editions and Platforms managed

VMControl	VMControl Express Edition	VMControl Standard Edition Image Management	VMControl Enterprise Edition Pools for Power Systems
Virtualization Capabilities	**Virtualize** resources	**Manage** virtual images	**Optimize** system pools
PowerVM / System i	**yes**		
PowerVM / Aix	**yes**	**yes**	**yes**
PowerVM / Linux on Power	**yes**	**yes**	
System x / Xen	**yes**		
System x / Hyper V V2	**yes**		
System x / VmWare V4	**yes**		
System z / Linux on Z	**yes**	**yes**	

VMControl Editions and Platforms for ISD Server

VMControl	VMControl Express Edition	VMControl Standard Edition Image Management	VMControl Enterprise Edition Pools for Power Systems
Virtualization Capabilities	**Virtualize** resources	**Manage** virtual images	**Optimize** system pools
i6/OS			
AIX	**yes**	**yes**	**yes**
Linux on Power	**yes**	**yes**	**yes**
Linux on System x	**yes**	**yes**	**yes**
Windows on System x	**yes**	**yes**	**yes**
Linux on system Z	**yes**	**yes**	**yes**

VMControl Editions and PowerVM

VMControl	VMControl Express Edition	VMControl Standard Edition Image Management	VMControl Enterprise Edition Pools for Power Systems
Virtualization Capabilities	**Virtualize** resources	**Manage** virtual images	**Optimize** system pools
PowerVM	AIX, i for Business, Linux	AIX	AIX
Create/manage virtual machines (x86, PowerVM and z/VM)	✓	✓	✓
Virtual machine relocation	✓	✓	✓
Capture/import, create/remove standardized virtual images		✓	✓
Deploy standard virtual images		✓	✓
Maintain virtual images in a centralized library		✓	✓
Create/remove system pools and manage resources in system pools			✓
Add/remove physical servers within system pools			✓

Supported Virtualization Environments

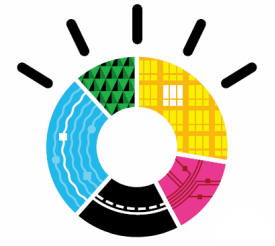
Supported Functions	Power Systems (HMC or IVM managed)	VmWare VCenter	Windows Server 2008 Hyper-V	Z/VM
Import Virtual Appliances	yes			yes
Capture Virtual Servers	yes			yes
Create, Delete and Edit Virtual Servers	yes	yes	yes	yes
Deploy Images	yes			yes
Group virtual Servers to create workloads	yes			
Relocate Virtual servers	yes	yes		
Create and Manage System pools	yes (with PowerVm Enterprise Ed)			

CSM Transition

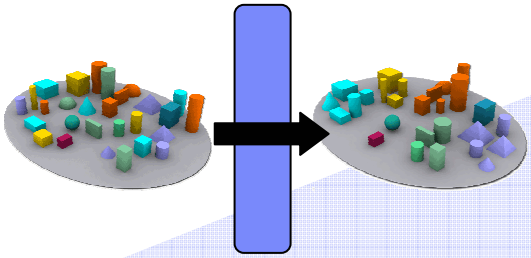
*This statement represents IBM's current intent and objectives and is subject to change or withdrawal without notice.

Cluster Systems Management features	Comparable capabilities available with Systems Director and Systems Director VMControl Standard Edition
System discovery	✓ Systems Director
Firmware flashing	✓ Systems Director
Support NIM-based AIX image deployment	✓ Systems Director VMControl 2.2 Standard Edition
AIX mksysb image deployment to one or multiple servers simultaneously	✓ Systems Director VMControl 2.2 Standard Edition
Power Systems Linux deployment to one or multiple servers simultaneously	✓ Systems Director VMControl 2.2 Standard Edition
Deploy AIX to non-virtualized Power server blades	✓ Systems Director VMControl 2.2 Standard Edition
Distributed command execution (dsh)	✓ Systems Director
Remote power control (rpower)	✓ Systems Director
Remote serial console (rconsole)	✓ Systems Director
Event monitoring and automation	✓ Systems Director
Command Line Interface (CLI)	✓ Systems Director and Systems Director VMControl 2.2 Standard Edition

VMControl provides a path to cloud computing

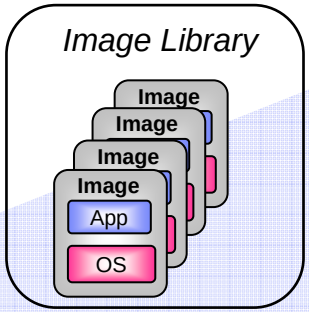


Virtualize using Best Practices



- Select Best Practice Patterns based on business needs
- Create standardized virtualized building blocks
- Select default behaviors
- More consistent management

Manage Virtual Machine Images



- Capture and catalog virtual images used in the data center
- Standardize virtual image building blocks
- Customize virtual environment runtime requirements
- Simplified deployment with virtual appliances

Optimize with System Pools

- Pool standardized virtualized building blocks
- Many managed as one
- Automatic placement for new workloads
- Aggregated monitors and event management
- Unified update management profiles for firmware
- Durable, Plug-and-play capacity across HW generations

Cloud-Ready

- Workload centric management based on service level goals
- Assure SLA achievement
- Integrated virtualization management with IT processes
- Always available
- Elastic scaling
- Pay for use
- Automated provisioning

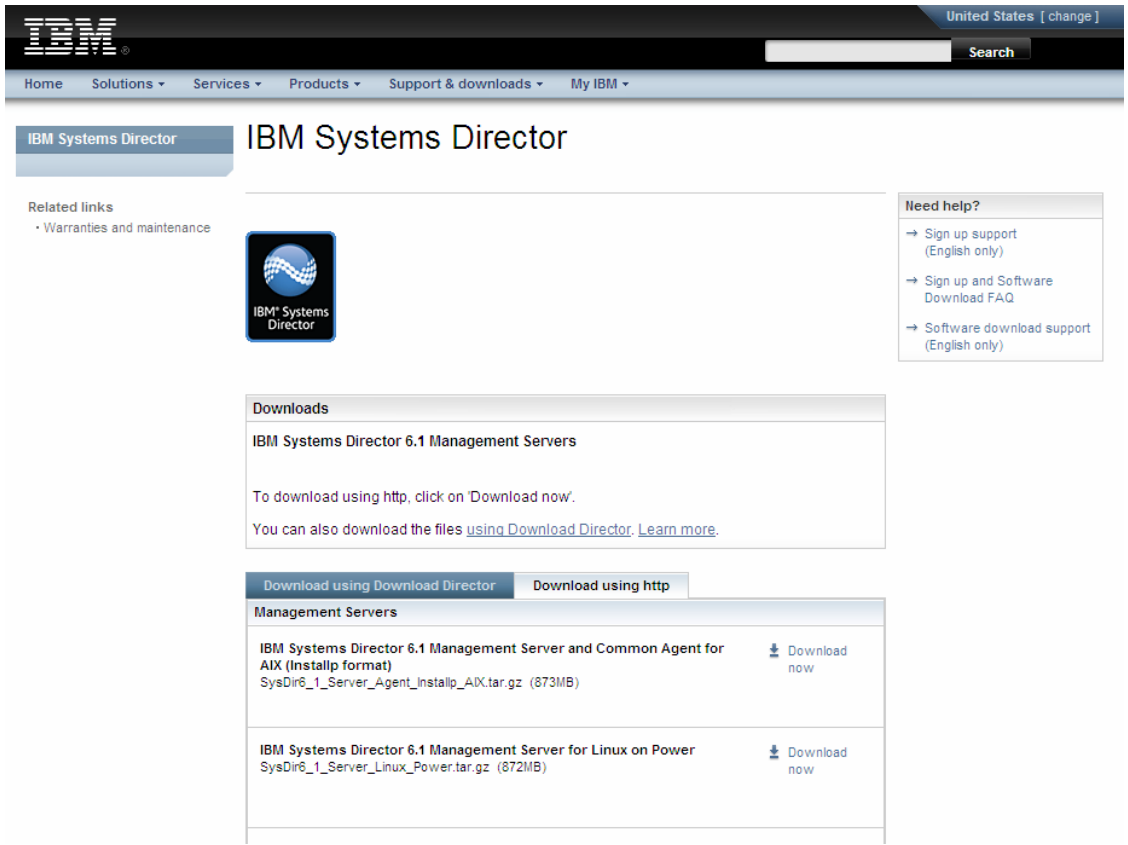
VMControl Download and Installation

Management server installation hardware requirements

- Download all VMControl Editions from IBM Systems Director download Web site

http://www.ibm.com/systems/management/director/downloads/

- Supported IBM systems
  - VMControl is supported on all IBM systems that are supported by IBM Systems Director Server 6.1.2
- Supported operating systems
  - VMControl is supported on all operating systems that are supported by IBM Systems Director Server 6.1.2
- Additional prerequisites
  - Ensure that you have the appropriate x11 libraries installed on target system.

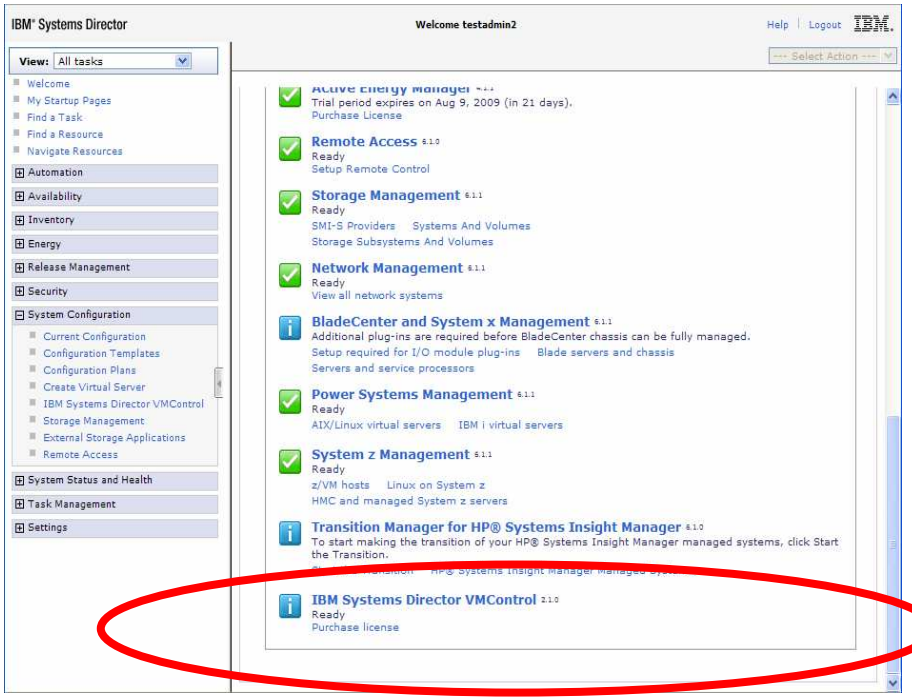


IBM Systems Director and VMControl Editions

References

- VMControl Information Center:
  http://publib.boulder.ibm.com/infocenter/director/v6r1x/index.jsp?topic=/vim_210/fsd0_vim_main.html

- DMTF Open Virtualization Format (OVF) Specification:
- http://www.dmtf.org/standards/published_documents/DSP0243_1.0.0.pdf



PowerVM AIX Virtual Servers Capture Prerequisites

- You can capture a Power Systems virtual server to create a virtual appliance in the following environments:
  - A virtual server (logical partition) on a Power Systems(POWER5™ and POWER6®) server under AIX >= 5.3.8 that is managed by
  - Hardware Management Console (HMC) or Integrated Virtualization Manager (IVM)
  - A virtual server on a Power Architecture® BladeCenter® server that is managed by IVM

- You can capture a Power Systems virtual server when the following prerequisites are met:
  - A NIM master is running and able to access the virtual server over the network.
  - IBM Systems Director VMControl has recognized the NIM master as an image
  - repository in the environment.
  - The host name from the primary and secondary network interfaces of the virtual server are resolved from the nim master
  - There is sufficient space on the NIM master under /export/nim/appliances to store the captured virtual server.
  - The Hardware Management Console (HMC) or Integrated Virtualization Manager (IVM) that manages the virtual server is discovered in IBM Systems Director. Access status is listed as OK.
  - The virtual server that you want to capture and the operating system running on it is discovered in IBM Systems Director. Access status is listed as OK.
  - The virtual server has at least one virtual Ethernet adapter.
  - The virtual server is **not** a full system partition, or the only partition on the host to which all host resources are dedicated.

PowerVM AIX Virtual Servers Capture Modes

- Living Virtual Servers Capture (by Wizard or Command mode)
  - smcli lsrepos –o ← permet de récupérer oid du repository nim
  - smcli lscapsrv | grep -i testing-clone1← permet de récupérer oid du système à clôner
  - smcli captureva -n TESTING-CLONE -r 61343 -s 68117

- Mksysb Capture (by Command mode only)
  - smcli captureva -vr 61343 -n jmb_test –F repos://export/mksysb/jmb/mk_basics_53tl8sp1_20avr09

PowerVM AIX Virtual Servers Deployment Prerequisites 1/2

- You can deploy a virtual appliance to create or overwrite a virtual server in the following environments:
  - A virtual server (logical partition) on a Power Systems server that is managed by Hardware Management Console or Integrated Virtualization Manager
  - A virtual server on a Power Architecture BladeCenter server that is managed by IVM

Note: You cannot perform the deploy, capture, or relocate tasks concurrently for the same AIX virtual server. Wait until one of these tasks is complete before beginning another.

You can deploy a virtual appliance to an ***existing*** virtual server when the following prerequisites are met:

- The HMC or IVM that manages the target virtual server is discovered in IBM Systems Director. Access status is listed as OK, and inventory is collected for the HMC or IVM. If the virtual server has an operating system installed, it will be overwritten when the virtual appliance is deployed.
- A NIM Master is running and is accessible by your IBM Systems Director Server.
- IBM Systems Director VMControl has recognized the NIM master as an image repository in the environment.
- The NIM Master is able to access the target virtual server and the HMC or IVM that manages it over the network.
- The hostname for the primary and secondary network interfaces of the virtual server where you want to deploy the virtual appliance can be resolved from the NIM Master.
- The virtual server is not a full system partition, or the only partition on the host to which all host resources are dedicated.
- A supported storage configuration is available and discovered in IBM Systems Director:
  - SAN-based storage that is allocated from a storage pool hosted by the Virtual I/O Server. See the Supported storage devices topic for a list of supported storage devices.
  - Local storage that is allocated from a storage pool hosted by the Virtual I/O Server.

PowerVM AIX Virtual Servers Deployment Prerequisites 2/2

You can deploy a virtual appliance to a ***new*** virtual server when the following prerequisites are met:

- The Hardware Management Console (HMC) or Integrated Virtualization Manager (IVM) that will manage the new virtual server is discovered in IBM Systems Director. Access status is listed as OK, and inventory is collected for the HMC or IVM.
- The NIM Master is running and is accessible by your IBM Systems Director Server.
- IBM Systems Director VMControl has recognized the NIM master as an image repository in the environment.

Note: IBM Systems Director VMControl can recognize just one NIM master as an image repository; multiple NIM Master image repositories are not supported.

- A NIM Master has network access to the HMC or IVM that will manage the new virtual server. The virtual server that you plan to create must also have network access to the NIM Master.
- The hostname for the primary and secondary network interfaces of the virtual server where you want to deploy the virtual appliance can be resolved from the NIM Master. Either define the hostname on the name server, or add it to /etc/hosts on the NIM Master.
- A supported storage configuration is available and discovered in IBM Systems Director:
  - SAN-based storage that is allocated from a storage pool hosted by the Virtual I/O Server. See the Supported storage devices topic for a list of supported storage devices.
  - Local storage that is allocated from a storage pool hosted by the Virtual I/O Server.

PowerVM AIX Virtual Servers Deploy Modes 1/2

- Empty Virtual Server Creation (by Wizard or Command mode)
  - smcli lssys –o | grep 516FA8C ← permet de récupérer oid du repository nim
  - smcli lsvrtcap -c mkvs -n 0xe8a5 ← permet de récupérer les attributs possibles du vs à créer
  - smcli mkvs –A "gos=IBM Power – AIXLINUX,name=TESTING-CLONE1,cpumode=shared,cpushared=2,memsize=1024,network=1,disks=disk1:client_data:TESTING-VIOS1" 0xe8a5

- Deployment of a virtual appliance to existing Virtual Server (by Wizard or Command mode)
  - smcli lsva –ol | grep –p jmb_test <- permet de connaitre oid virtal appliance
  - smcli lsdeploytargets –oa deploy_existing | grep TESTING-CLONE1 <- permet de connaitre oid virtual server
  - smcli lscustomization -a deploy_existing -V 62427 -s 68117 <- permet de connaitre les attributs de déploiement
  - smcli deployva –a deploy_existing –V 62427 –s 68117 –
    A "product.AIX1.com.ibm.ovf.vim.2.networkport.6.ip=9.212.128.92,
    product.AIX1.com.ibm.ovf.vim.2.networkport.6.netmask=255.255.252.0,
    product.AIX1.com.ibm.ovf.vim.2.networkport.6.gateway=9.212.131.254,
    product.AIX1.com.ibm.ovf.vim.2.system.hostname=clone1"

  Deployment of a virtual appliance to a new Virtual server

  - smcli captureva -vr 61343 -n jmb_test –F repos://export/mksysb/jmb/mk_basics_53tl8sp1_20avr09

PowerVM AIX Virtual Servers Deploy Modes 2/2

- Deployment of a virtual appliance to a new Virtual Server (by Wizard or Command mode)
  - smcli lsva –ol | grep –p jmb_test <- permet de connaitre oid virtual appliance
  - smcli lsdeploytargets –oa deploy_new | grep CHOIZAL <- permet de connaitre oid server
  - smcli lscustomization -a deploy_new -V 62427 -s 59557 <- permet de connaitre les attributs possibles de déploiement
  - smcli deployva –a deploy_new –V 62427 –s 59557
    –A "poolstorages=client_data:VIOS TESTING-VIOS1,
    virtualnetworks[Virtual Network 1]=hostVnet:ETHERNET0/1,
    product.AIX1.com.ibm.ovf.vim.2.networkport.6.ip=9.212.128.92,
    product.AIX1.com.ibm.ovf.vim.2.networkport.6.netmask=255.255.252.0,
    product.AIX1.com.ibm.ovf.vim.2.networkport.6.gateway=9.212.131.254
    product.AIX1.com.ibm.ovf.vim.2.system.hostname=clone2"

Other IBM Systems Director features/plugins linked to provisioning

- IBM Systems Director update manager :
  - AIX updates (TL or SP update) using IBM AIX acquisition server and NIM since AIX 5.3 TL6
  - HMC Code updates using IBM HMC acquisition provider since 7.3.1 level (In reality, only HMC Codes 7.3.3 and higher are supported)
  - Power6 and Power5 (since SF240) firmware Code updates using Power System Firmware Acquisition Provider and HMC (or AIX if no HMC)
  - VIOS updates with VIOS acquisition provider (in the future ISD 6.1.2)
- Tivoli Provisioning Manager for Operating System Deployment (TPM for Osd)
  - Initial provisioning of AIX images with DVD images without NIM (BOOTP/DHCP/NFS process)

Desired Enhancements

- Be able to specify cpu/cpushare/memory min/des/max when creating virtual servers with wizard : (only desired cpu/mem specified for the moment (cpushare=cpu/10))

- Be able to specify cpu/cpushare/memory min/des/max when deploying on a new virtual server with wizard :
  (only 1/1/1 for both cpu/cpushare/memory for the moment)

- Be able to specify physical adapters when deploying on a new virtual server with wizard.

- Support Dual VIOS Configurations with scsi virtualization when deploying virtual appliances

http://www-01.ibm.com/redbooks/community/display/director/VMControl+for+Power+Information

- Support Virtual Fiber Channel adapter configuration when deploying virtual appliances

- Support dedicated network and dedicated physical disks for rootvg when deploying virtual appliances

- Support NPIV/FC virtualization mode when deploying virtual appliances

- Be able to accept licenses when using **update_manager** to change AIX TL or SP level of an AIX operating system LPAR