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S56 - Gestion d'un Cloud privé IBM i avec PowerVC

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IBM i Private Cloud Management using PowerVC

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- Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream,
the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

IBM

Agenda

- PowerVC Overview
  - Offering Structure
  - Benefits
  - Architecture
  - PowerVC Key Functions
    - Host Groups / Placement Policies
    - Storage Connectivity Groups
    - VM Capture & Deployment
    - Remote VM Restart
    - Self-Service Portal
  - PowerVC Enhancements
  - IBM i Cloud Enhancements
  - Getting Started: PowerVC Initial Setup

- Demo

IBM Power Systems Management Strategy

Infrastructure as a Service with IBM Cloud PowerVC Manager

Cloud Management

IBM Cloud PowerVC Manager

- End-user self-service provisioning of IaaS for PowerVM
- Service catalog with virtual systems and applications
- Subscriber and account management (multi-tenancy)
- Private Cloud focused and exploiting Power Systems

Virtualization Management with PowerVC

Virtualization Management

PowerVC Std. Edition

- Leadership solution for PowerVM and PowerKVM
- Virtual Image Management and Deployment
- Resource Pooling and Dynamic VM Placement
- On-going optimization and VM resilience

Power Systems Hardware Management Console

Platform Management

HMC

- Hardware and firmware management for Power
- Hardware and firmware configuration and controls
- Service, support and update management
- Hardware appliance

Providing comprehensive and consistent management experience for Power Servers

PowerVC Offering Structure

PowerVC Standard Edition
Simplified lightweight <u>advanced virtualization management</u> for Power Systems

IBM Cloud PowerVC Manager
Simplified lightweight <u>private cloud</u> for Power Systems

IBM Cloud PowerVC Manager for SDI*
IBM Cloud PowerVC Manager bundled with Spectrum Scale for building a <u>SAN-less</u> <u>Software Defined Infrastructure</u>

✓ Cloud PowerVC Manager is included in AIX EE,
✓ ICMO customers with current SWMA are entitled to Cloud PowerVC Manager
✓ Sold standalone as well

Price metric: Managed Cores

PowerVC Feature	Standard Edition	Cloud Manager	Cloud Manager for SDI*
HMC Support	✓	✓	✓
PowerVM, PowerKVM	✓	✓*	✓*
Managed P6 or later	✓	✓	✓
Managed VM Type	AIX, IBM i, Linux	✓	✓
Managed From OS	RHEL (Power or x86)	✓	✓
HA VIOS configs	✓	✓	✓
One-click Evacuation	✓	✓	✓
Automatic Remote VM Restart	✓	✓	✓
Host Groups	✓	✓	✓
Affinity Rules	✓	✓	✓
Dynamic Resource Optimizer	✓	✓	✓
Self-service portal		✓	✓
Access to OpenStack directly		✓	✓
Policy-based Approvals		✓	✓
Deploy Templates		✓	✓
Metering		✓	✓
Import / Export Images		✓*	✓*
Software Defined Storage			✓

* Oct. announcement for PowerVC 1.4.0 with planned GA 12/15

PowerVC Benefits for Virtual Systems Management

Managing a pool of resources with single system simplicity

Image Deployment and Capture

VM Monitoring, Mobility and Lifecycle Management

Policy-based VM Placement

✓ Power Systems usability made **simple**
✓ Building block for Power Systems **private clouds**
✓ **Increase agility** and execution to quickly respond to changing business requirements
✓ **Increase IT productivity** and responsiveness
✓ **Manage scalability** without adding complexity
✓ **Dynamically adjusts** workloads to ease burden on systems management

One-click System Evacuation and VM Resilience

Ongoing Optimizations and Rebalancing (DRO)

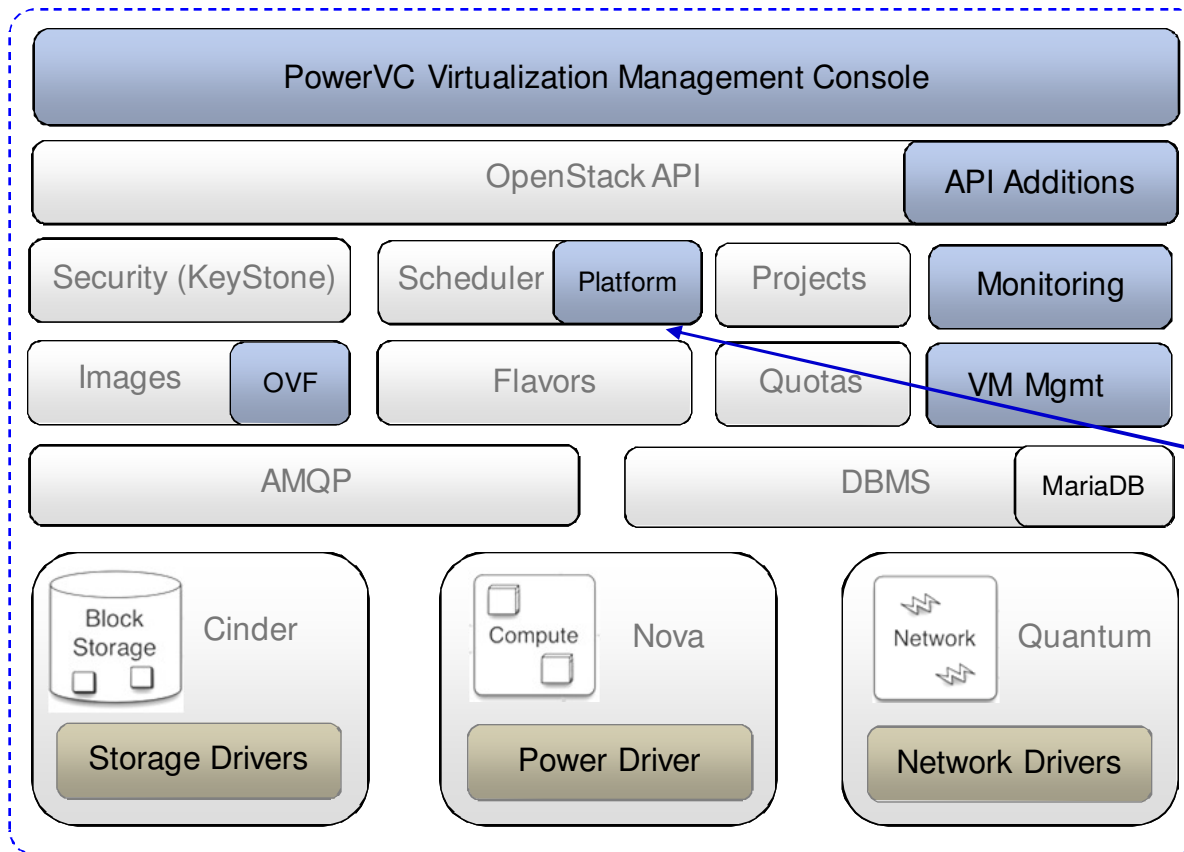**Multi-Tenancy and Resource Isolation for Cloud Enablement**

Integrated Server, Storage and Network Provisioning

PowerVC Architecture built on OpenStack

OpenStack, Platform Computing and other IBM Value Added Components

PowerVC Virtualization Management Console

OpenStack API — API Additions

Security (KeyStone) — Scheduler — Platform — Projects — Monitoring

Images — OVF — Flavors — Quotas — VM Mgmt

AMQP — DBMS — MariaDB

Block Storage — Cinder — Storage Drivers

Compute — Nova — Power Driver

Network — Quantum — Network Drivers

Storage
IBM and 3rd Party

IBM Power Systems

Network
IBM and 3rd Party

Virtualization Mgmt UI
- Simple and Intuitive
- Targeting the IT Admin

New Management APIs
- Virtualization Management
- Monitoring & Events

New Mgmt Capabilities
- Monitoring & Events
- More granular VM Mgmt
- OVF Image Formats
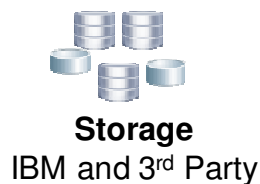- Configuration Patterns

Platform provides…
- Virtual Machine Placement
- Workload Aware Mgmt
- Performance Mgmt
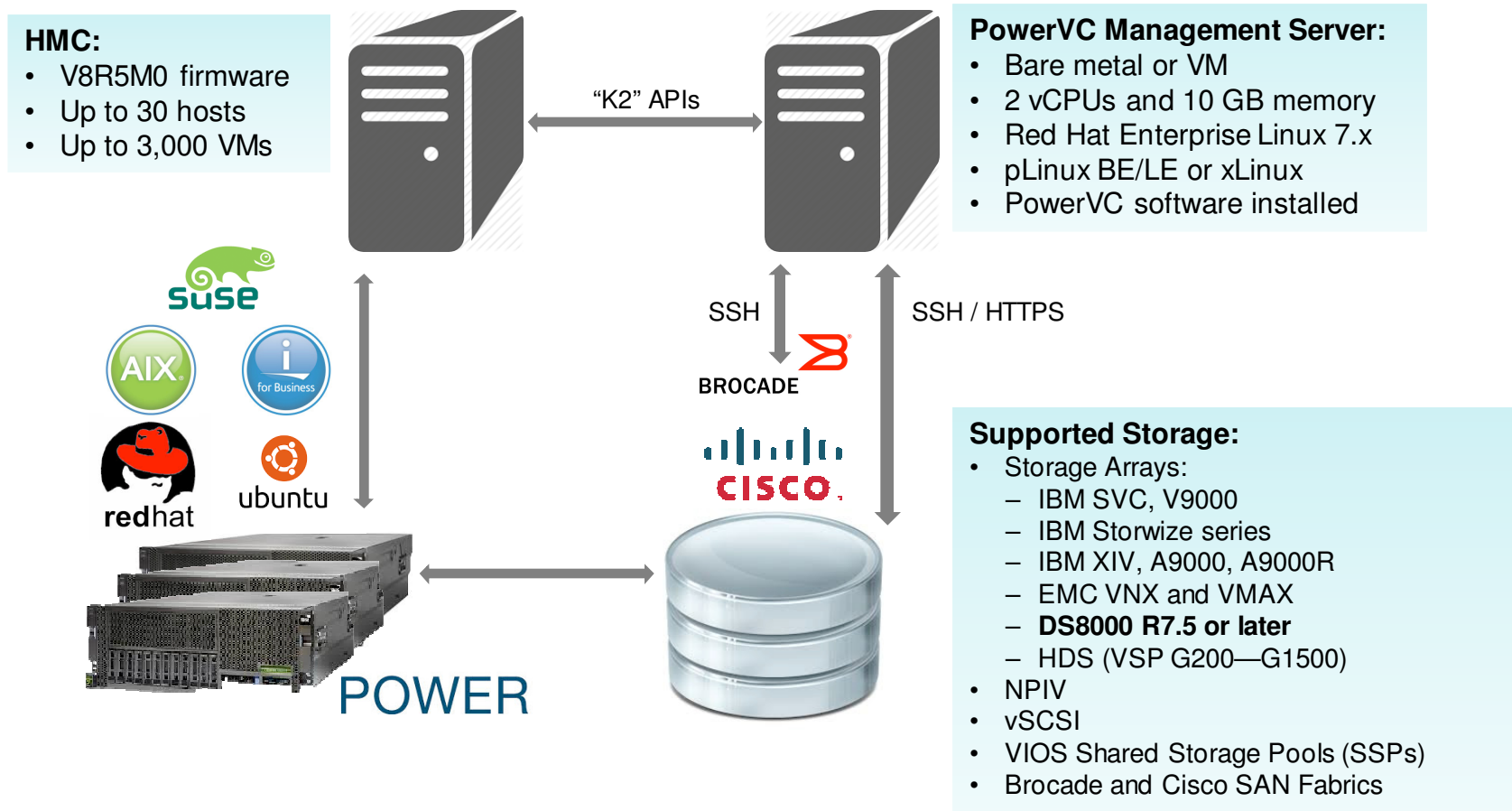- Availability Mgmt

Virtualization Drivers
- Nova drivers for HMC / NovaLink
- Leverage ecosystem to support broad range of IBM and non-IBM storage and network attached to Power

Packaging and Simplification
- Simplified Install and Config
- Intuitive Administration Model
- Focus on day 0/1 TTV

8

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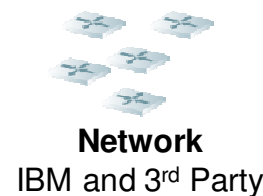
PowerVC Operational Architecture for PowerVM (HMC)

HMC:
- V8R5M0 firmware
- Up to 30 hosts
- Up to 3,000 VMs

"K2" APIs

PowerVC Management Server:
- Bare metal or VM
- 2 vCPUs and 10 GB memory
- Red Hat Enterprise Linux 7.x
- pLinux BE/LE or xLinux
- PowerVC software installed

SSH

SSH / HTTPS

BROCADE

CISCO

POWER

Supported Storage:
- Storage Arrays:
  - IBM SVC, V9000
  - IBM Storwize series
  - IBM XIV, A9000, A9000R
  - EMC VNX and VMAX
  - **DS8000 R7.5 or later**
  - HDS (VSP G200—G1500)
- NPIV
- vSCSI
- VIOS Shared Storage Pools (SSPs)
- Brocade and Cisco SAN Fabrics

Alternatively to the PowerVC management via the HMC, for POWER8 a PowerVM NovaLink partition can be used for PowerVM scale-out OpenStack cloud management.

PowerVC Host Groups

*Host Groups** allow the PowerVC administrator to create a logical boundary around a group of physical servers
- Each server can only be in one host group
- Deployment, mobility and remote restart are only allowed within the group
- Each group has its own placement policy
- Hosts are placed in the default group when added

* introduced in PowerVC v1.2.3

"POWER8" Host Group

Host 3   Host 4

Host 1

"POWER7" Host Group

Host 6

Host 7

Host 5

Host 2

"Sandbox" Host Group

Host 8   Host 9

Default Host Group

Host 10   Host 11
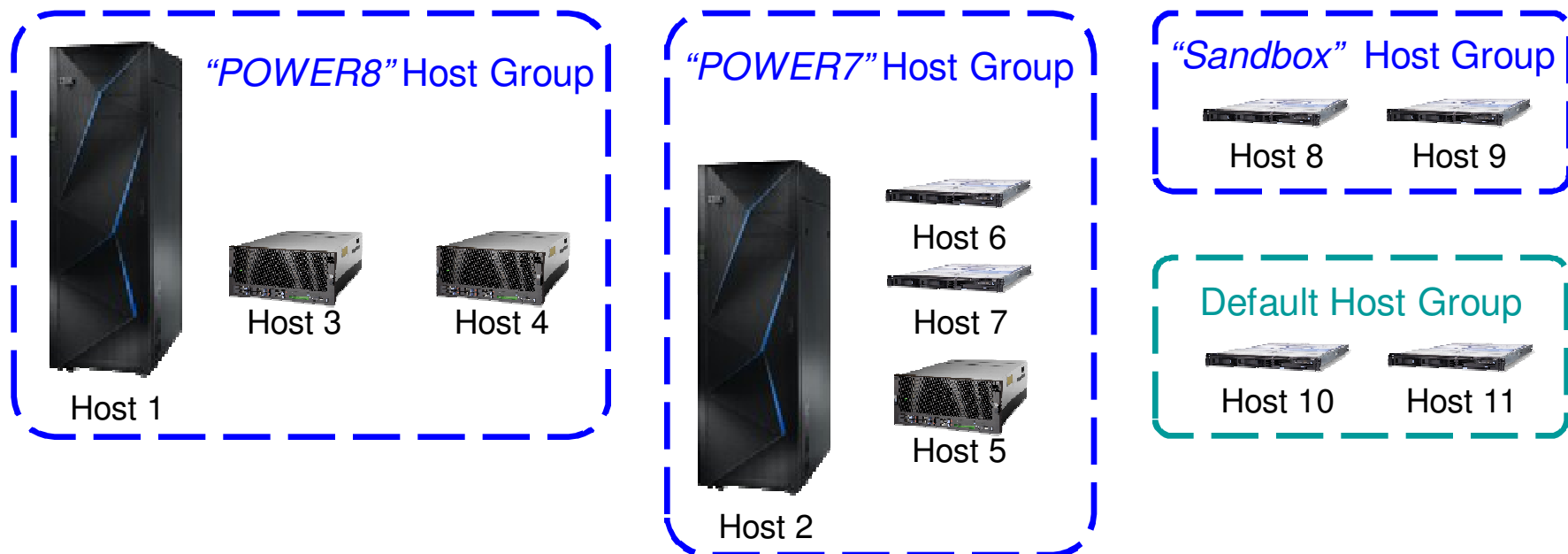
PowerVC Virtual Machine Placement Policies

Policy Description	Initial Placement	Dynamic Optimization	
Packing	▪ Pack workload on fewest physical servers ▪ Maximizes usable capacity, reduces fragmentation, reduce energy consumption	✓		
Striping (default)	▪ Spread workload across as many physical servers as possible ▪ Reduce impact of host failures, higher application performance	✓		
CPU Balance	▪ Place VMs on the hosts with the least allocated CPU ▪ Higher application performance	✓	✓	
Memory Balance	▪ Place VMs on the hosts with the most available memory ▪ Improve application performance	✓	✓	
Affinity	▪ Affinity specifies that VMs should be placed on the same host or few hosts ▪ Useful for collocating VMs on the same host(s)	✓	✓	
Anti-Affinity	▪ Do not place VMs on same host ▪ Useful for ensuring VMs are not collocated ▪ Availability cluster support (e.g. PowerHA) ▪ Higher application performance	✓	✓	

PowerVC – Storage Connectivity Groups

Storage connectivity groups allow for advanced placement control for VMs regarding:

- Virtual I/O Server usage
- FC port usage and thus usage of attached storage
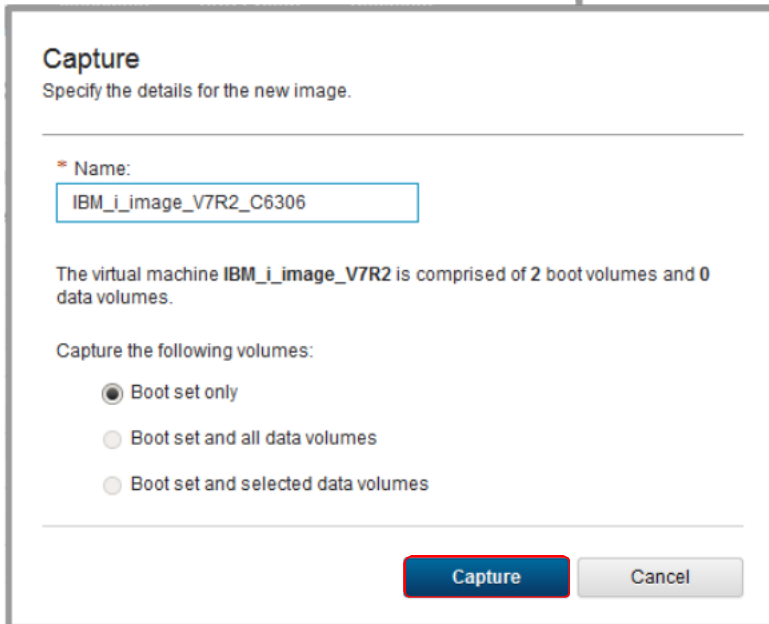- Useful e.g. for separation of production, development and test environments
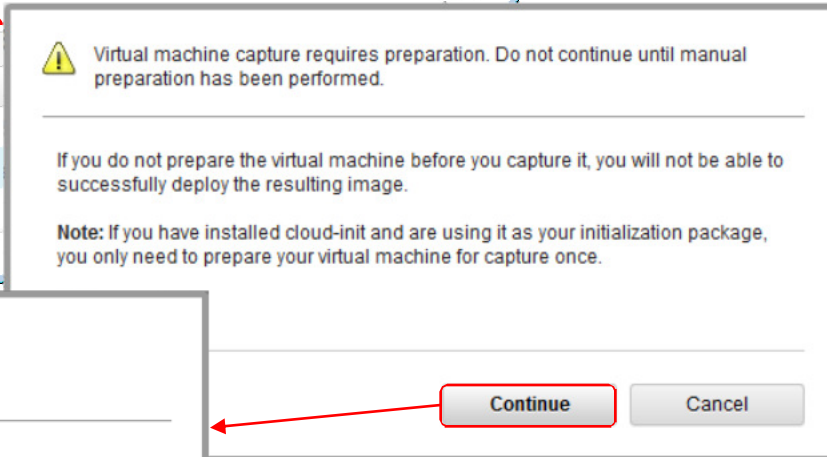
PowerVC – Capturing an existing Virtual Machine (1/2)

Preparation for IBM i:

1) `CALL PGM(QSYS/QAENGCHG) PARM(*ENABLECI)`

2) `PWRDWNSYS`

Existing VMs can be captured as images within the image repository

– Virtual machine to be captured needs to be prepared with cloud-init installation/activation and powered down before its capture

– FlashCopy is used for image creation with storage provisioned from the virtual machine's storage pool

PowerVC – Capturing an existing Virtual Machine (2/2)

Confirm Capture

Confirm the capture of virtual machine **IBM_i_image_V7R2**. The deployable image **IBM_i_image_V7R2_C6306** will be comprised of the following volumes:

Name	2 ▲	Boot Set	1 ▼
IBM_i_image_V7R2_P7		Yes	
IBM_i_image_V7R2_P7_vol2		Yes	

Capture   Cancel

Newly captured IBM i virtual machine shown as new image in PowerVC's Images view

Firefox ▼

IBM PowerVC | Images   × +

IBM PowerVC   Configuration   Messages   DRO Events   Requests   idimmer (ibm-default) ▼   ⑦ ▼   IBM.

Images

Images   Deploy Templates

🔁 Refresh | ▷ Deploy ✗ Delete 📋 Import ✎ Edit Description   Filter

📋 Create Deploy Template

↪ No filter applied

Name	⬍	State	Operating System	Description	Last Updated
IBM_i_image_V7R2_C6306		🟩 Active	IBM i		March 27, 2017 at 4:05:41 PM W. Europe Standard Time
AIX_image_V7.2TL1		🟩 Active	AIX		March 24, 2017 at 9:48:29 AM W. Europe Daylight Time

Total: 2 Selected: 0

PowerVC – Image Deployment for new Virtual Machines (1/3)

- **Images within the Repository can be deployed with policy based placement**

  - Virtual machine is created based on the selected templates

  - Required storage is allocated and attached to the virtual machine

  - Virtual machine is connected to the VLAN specified in the network template

  - Operating System is configured with the specified IP configuration and activation input at first boot

At-a-Glance View of Allocation…
  Processor, memory and disk:
  - Current allocations
  - Allocations resulting from deploy

Deploy Target…
  - Host / host group selection
  - Determines available networks

Storage Templates…
  - Storage provider & storage pool configuration

Virtual Machine Compute Templates…
  - Processor, memory and disk
  - Allows override at time of deploy

Network Templates…
  - VLAN ID and IP Configuration
  - User specified IP for new VM
  - Provided to OS as part of activation

Activation Input…
  - Configuration script for cloud-init
  - Can include IBM i CL commands

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PowerVC – Image Deployment for new Virtual Machines (2/3)

Images ▶ Deploy IBM_i_image_V7R2_C6306

Deploy IBM_i_image_V7R2_C6306

▼ General

* Virtual machine name:

i7PFE3

* Instances:

1

IBM i system name build from specified virtual machine name

Images ▶ Deploy IBM_i_image_V7R2_C6306

Deploy IBM_i_image_V7R2_C6306

▼ Activation Input

? Learn more about activation input

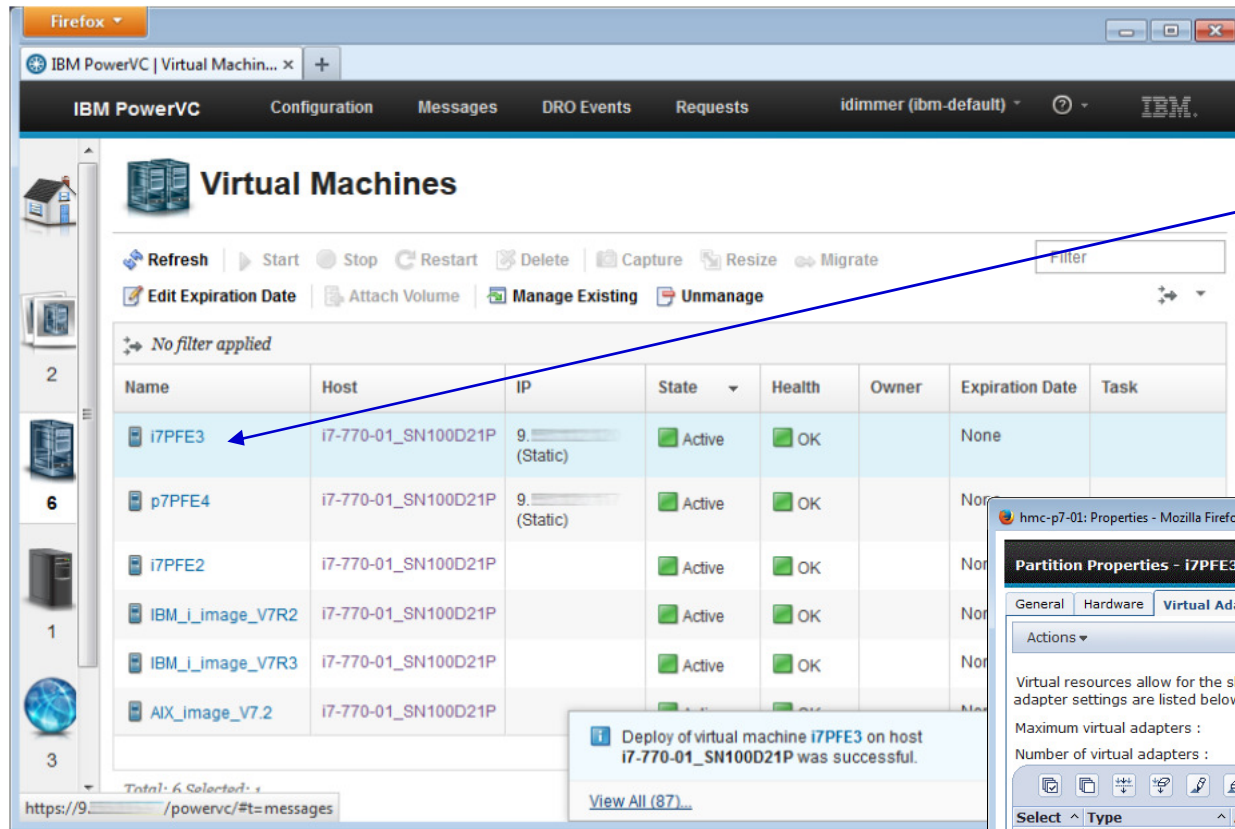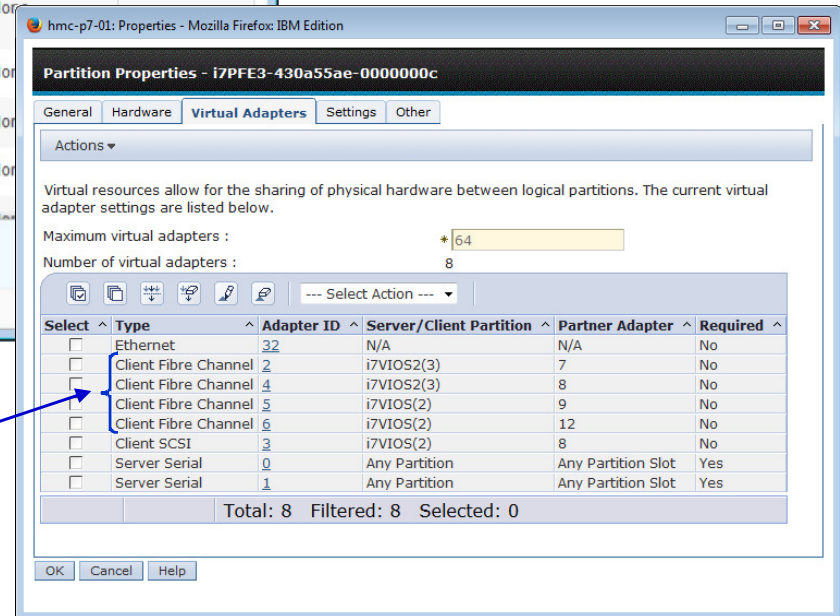Configuration script:

● Enter text ○ Select file

```
#!/bin/sh
system "CRTUSRPRF USRPRF(demouser) PWDEXP(*YES)"
```

Example of customized activation input for IBM i

Deploy   Cancel

PowerVC – Image Deployment for new Virtual Machines (3/3)

New IBM i virtual machine successfully deployed and activated based on specified template settings incl. assigned system name and IP address

VM configured with dual VIOS redundant SAN fabric NPIV attachment

PowerVC 1.3.x Dynamic Resource Optimizer

Continous Host Resource Monitoring with optional automatic Workload Re-Balancing

– DRO helps to ensure expected performance levels for workloads in the cloud

– Can be enabled/disabled with customized tresholds e.g. for CPU or memory* utilization at the PowerVC host group level

– For hosts in a Power Enterprise Pool DRO activates available mobile CoD cores first before VM migration

– Supported on PowerVM (NovaLink and HMC) and PowerKVM
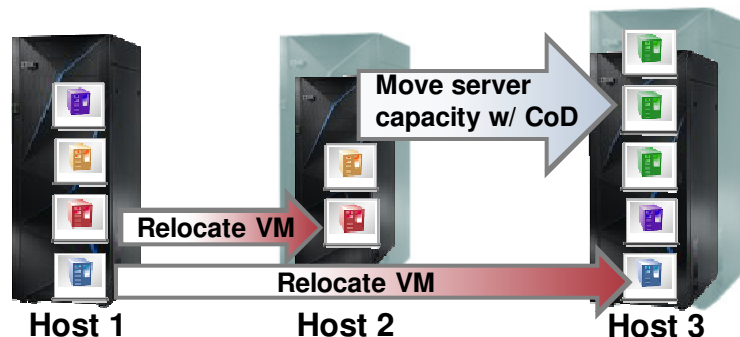
Hosts ▸ Host Group: Default Group

Host Group: Default Group

Dynamic Resource Optimizer

(?) *Learn more about DRO settings*

☑ Configure Dynamic Resource Optimizer (DRO)

Schedule:
  ◉ Always enable DRO
  ○ Enable DRO during specific times

Mode:
  ◉ Advise only: Optimization operations are recommended but not performed when the specified threshold value is exceeded.
  ○ Active: Optimization operations are performed when the specified threshold value is exceeded.

Resource to monitor:
  ◉ CPU
      Operations (select at least one):
      ☑ Migrate virtual machines to another host in the host group. Migrations are performed after mobile cores have been activated, if applicable.
      ☐ Activate mobile cores on the host. Requires that the host is a member of an enterprise pool.
 ○ Memory. Migrate virtual machines between NovaLink managed hosts.

* Utilization threshold (%):	70
* Run interval (minutes): (?)	5
* Stabilization (times): (?)	2
* Maximum concurrent migrations: (?)	10

* **Note:** Support for memory-rebalancing targeted at AIX/Linux environments, IBM i tolerated but assumed 100% memory usage

PowerVC 1.3.2 Automated VM Remote Restart

Automatically detect a host failure and restart VMs on healthy hosts

- Can be enabled/disabled at host group, host and VM level

- VMs are placed based on the host group's placement policy

- Supported on PowerVM (NovaLink and HMC) and PowerKVM

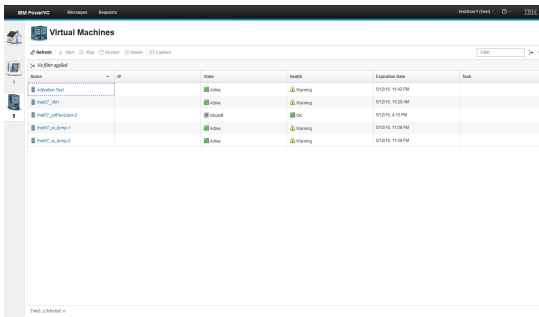- Works on AIX, IBM i and Linux VMs; requires POWER8
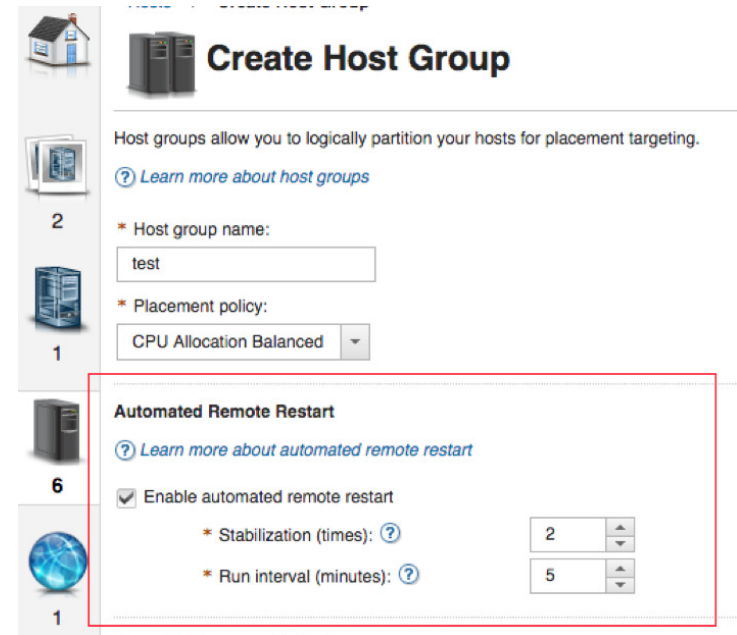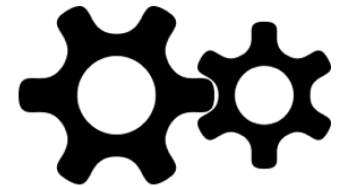
PowerVC Self-Service Portal – Cloud Admin and User View

Cloud Users

Cloud Administrator

**IBM Cloud PowerVC Manager
Self Service Portal / Admin GUI**

All PowerVC Operations

Deploy VMs

Deploy Templates Management

Approval Requests (approve / decline)

Request Expiration Date Extension

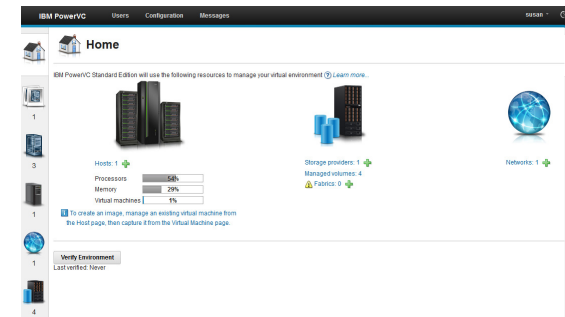**Policies**

Cloud user accesses the self-service portal:

- Selects a deploy template and clicks "deploy"
- Requests VM expiration date extension
- View metering data
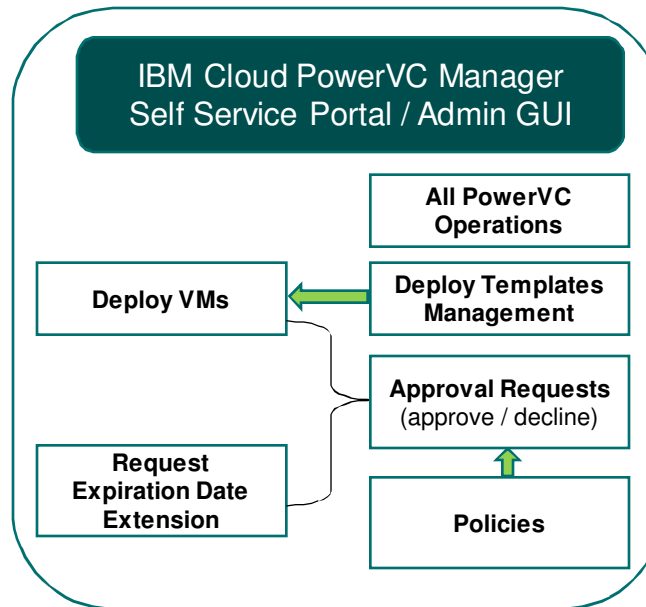
Cloud administrator configures and manages:

- Deploy templates
- Policies
- Approvals and expirations
- Metering data

PowerVC Self-Service Portal & Admin Approval

Cloud User:
VM Deployment
from Deploy Template

Cloud Admin:
Approves or
declines
request

PowerHA & PowerVC Availability Coverage

- PowerHA provides complete coverage for planned & unplanned outages with lowest recovery times

- PowerVC Remote VM Restart provides additional coverage for server hardware issues – like for backup partitions not protected by PowerHA
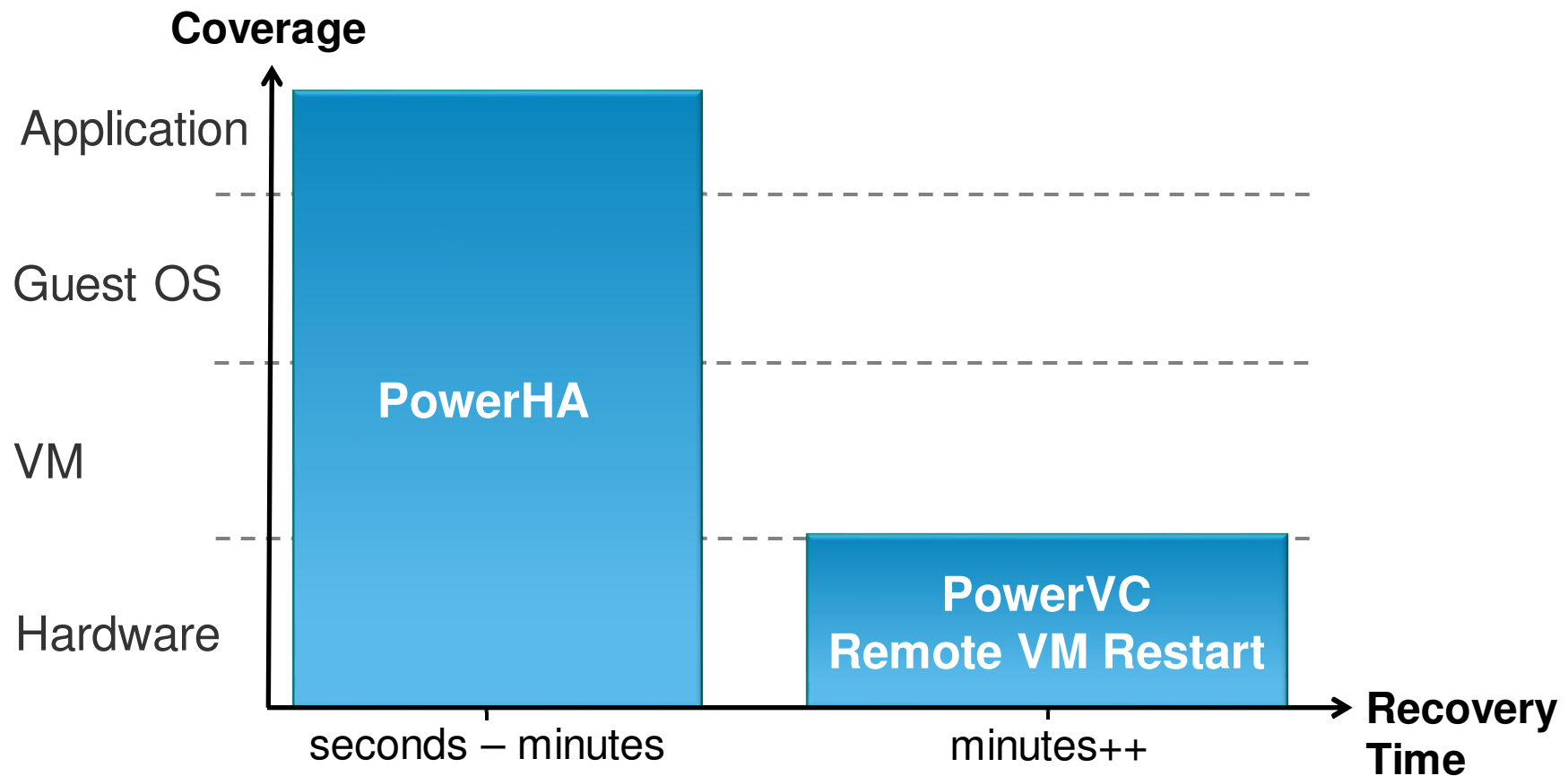
PowerVC 1.3.3 Enhancements

Power VC – Simplifying Management for Private Cloud Deployments

- Self-service cloud improvements
  - New UI for cloud admins which simplifies policy management
  - New project-level quotas which provide finer control over tenants usage
  - New email alerts for cloud admins for provisioning requests
  - Improved metering data with more detail on resource usage by tenant

- Management of PowerVM Open I/O based software defined networks which includes VXLANs and external IP addresses

- Brocade virtual fabric support

- Reference architecture to enable active-passive HA configurations for the PowerVC management server

- Dynamic Resource Optimizer can now balance Enterprise Pools mobile memory for NovaLink configurations

- Improved usability now allows renaming VMs in the PowerVC console

- Support for deploying VMs with 1/20th of a core granularity

- Tech Preview: Software Defined Storage with IBM Spectrum Scale integration

PowerVC 1.4.0 Enhancements (planned GA Dec. 15th)

- New Offering: *IBM Cloud PowerVC Manager for SDI*
  - Bundling of IBM Cloud PowerVC Manager with IBM Spectrum Scale (Data Mgmt. Edition 5.0) for building a SAN-less Software Defined Infrastructure

- Hybrid cloud image mobility
  - Seamless movement of virtual machine images between different storage arrays, data centers or clouds with one-click image export and import (currently to/from NFS location)

- PowerKVM support added to IBM Cloud PowerVC Manager
- Flexible SAN zone names
- VM live capture for SAP HANA (eliminating long restarts)
- Upgrade to latest OpenStack release Pike
- PowerVC UI update for usability optimization
- Tech Preview: Database as a Service (DBaaS)
  - Self-service DB provisioning and lifecycle mgmt. support for relational and NoSQL DBs leveraging OpenStack Trove as DBaaS engine
  - initially focussing on MongoDB and Redis running on Ubuntu

- Miscellaneous enhancements:
  - PowerVC UI support to expose DS8000 "LSS"
  - Enablement for pluggable iSCSI Cinder drivers (phase 1)
  - Optimization of PowerVC upgrade flow (e.g. 100-node deployment)
  - Employ Gnocchi for enhanced metrics collection (alleviates data retention issue)
  - ICMO PowerVC driver currency with PowerVC releases

IBM i 7.2 TR7 / i 7.3 TR3 Cloud Enhancements (GA Oct. 27ᵗʰ)

- Automatic enablement of cloud-init at PowerVC deployment time
  - Previously cloud-init had to be manually invoked before capturing an IBM i VM
  - Now cloud-init is automatically enabled to be invoked at deploy time when the image has both been captured and is being deployed on a POWER8 server

- Support for increasing the size of a LUN (i 7.3 TR3 only)
  - Previously increasing the size of a LUN was not supported by IBM i so that increasing external storage capacity required adding more LUNs
  - IBM i now recognizes the change in LUN size and will use the increased size at its next IPL
  - Allows to start with using smaller LUNs for an IBM i image in PowerVC that could be re-sized after the VM deployment

PowerVC – DS8000 Storage Templates for IBM i

- Before an existing IBM i partition using DS8000 R7.5 or later storage can be captured by PowerVC (as an image) a default DS8000 storage template must exist which matches the DS8000 volume model used by the IBM i virtual machine

  - The DS8000 storage template created by default when adding the DS8000 storage to PowerVC supports only flexible LUN sizes (either for VSCSI or NPIV attachment with volume type models 050/099)

  - A customized template to support DS8000 fixed LUN sizes, e.g. volume type model A04/A05 (protected 70 GB / 141 GB volume), can be created using a PowerVC Cinder driver REST API call using the cURL utility

Storage Template: PFE_DS8886

⑦ *Learn about storage templates*

🔄 Refresh   ✏️ Edit   ❌ Delete

▾ Information

Name:	PFE_DS8886_75FAW80 base template
ID:	618b3d5b-bb6e-4173-8a49-f02ea4bd42f7
Storage provider:	PFE_DS8886_75FAW80
Default:	No
Type:	Thin Provisioned
Storage pool:	HPFE_0_10

Customized template created via REST API

Storage Template: PFE_DS8886_75FAW80

⑦ *Learn about storage templates*

🔄 Refresh   ✏️ Edit   ❌ Delete

▾ Information

Name:	PFE_DS8886_75FAW80 A04 template
ID:	666d7296-9c0a-4435-93ef-e54aea881de3
Storage provider:	PFE_DS8886_75FAW80
Default:	Yes
IBM i Sector Type:	A04
Type:	Thick Provisioned
Storage pool:	HPFE_0_10

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Getting Started with PowerVC – Initial Setup Tasks

- RHEL 7.1+ Installation
- PowerVC Installation
- PowerVC Environment Verification
- PowerVC adding HMC(s)
- PowerVC adding host(s)
  - Optional: Compute template customization (for desired partition resource settings)
- PowerVC adding storage system(s)
  - Optional: Storage template customization (e.g. for changing default thin-provisioned volume allocation)
- SAN fabric zoning for VIOS servers with storage (required for both VSCSI and NPIV)
- PowerVC adding fabrics
  - Optional: Fibre Channel port configuration (to restrict FC port usage by PowerVC for virtual machine deployments)
  - Optional: Storage connectivity group creation (to select specific VIOS servers and FC ports for virtual machine deployments in conjunction with FC port tagging)
- PowerVC adding existing virtual machines (LPARs)
- PowerVC adding network(s) used for virtual machine deployment
- PowerVC Environment Verification
- Ready for using PowerVC
  - e.g. capturing existing virtual servers as images after cloud-init installation, deploying new virtual machines from images, resizing or migrating existing virtual machines

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- Demo

References (1/2)

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  https://www.ibm.com/support/knowledgecenter/SSVSPA_1.3.2/com.ibm.powervc.cloud.help.doc/kc_welcome-cloud-supermap.html

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- PowerVC Free Customer Trial
  https://www14.software.ibm.com/webapp/iwm/web/reg/download.do?source=IPVCv12E&S_PKG=trial&lang=en_US&cp=UTF-8

- PowerVC Hosted Trial – Try out PowerVC in IBM hosted environment for free
  https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Wc1c29d23e0fd_4346_b509_f1c00a2099f0/page/PowerVC%20Hosted%20Environment%20Details

- White Paper: Private Cloud Management for AIX and IBM i using IBM PowerVC
  http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102471
  http://w3-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP102471
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  https://www.ibm.com/developerworks/rfe/execute?use_case=changeRequestLanding&PROD_ID=1024

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Merci de votre attention

N'oubliez pas de remplir la
feuille d'évaluation !