AIX and Linux for SAP Environments

Alfred Freudenberger
North America Power Systems Sales Executive
afreude@us.ibm.com
512-659-8059

Blog: SAPonPower.wordpress.com
Approx. 9,000 customers use IBM Power Systems w/ AIX to run their SAP Business applications.

Total of about 27,000 SAP installs

Marketshare in SAP on UNIX > 50%

Power Systems 2014 Announcements

ALL systems are certified for use with SAP Business Suite right at GA, once the supporting OSs are SAP certified.

- per SAP PAM
POWER8 Is Another Building Block in a Lasting Partnership

A successful cooperation and technology integration between SAP and IBM

- New AIX JVM (J9) improved SAP NetWeaver environment
  - Subsequently replaced by SAPJVM
- POWER Live Partition Mobility (LPM)
  - Move running SAP instances from one server to another
- AIX Workload partitions
  - A lean and fast approach of OS virtualization
- Integration of PowerVM™ / AIX virtualization metrics into SAP CCMS
- Integration of PowerVM and Systems Director (now PowerVC) with SAP Landscape Virtualization Manager for Cloud like operations
- Optimized SAP NetWeaver Kernel (PBO, profile based optimization) for POWER platforms
- HANA on POWER porting and T&EA program 4Q14, Early Adopter 1Q15
PowerVM - Consolidation Benefits for SAP Transactions

- DB-Server to SAP App-Server round-trip time can have a substantial impact on SAP batch run times and transaction response times
  - 30% increase in processing time is quite common compared to 2-tier
  - Up to 100%, when applications perform a large number of database requests.

- In particular, batch jobs with many DB I/Os are impacted
  - DB-times only are smaller portion of an SAP dialog transactions

- “3-tier-in a box” setup exploiting PowerVM connectivity provide an alternative to physical scale-out landscapes
  - relatively low (<10%) incremental network delays
  - maintaining a high degree in resource and administration flexibility.

- Download WP: “Comparison of SAP Application Performance on Centralized versus Distributed Server Topologies”
SAP 2-tier and Consolidated Tiers Are Most Efficient Deployment Models

Results in up to 35% faster SAP processing speed.
- example here shows SAP Client Copy simulating batch processing
- Dialog transactions will benefit comparably, though not this easy to measure

Up to 70% faster DB- App-Server Communication on virtualized and consolidated POWER systems vs. distributed fully virtualized 3-tier landscapes
PowerKVM v2.1 for Linux Virtualization in SAP Landscapes

- Available at POWER8 GA
  - Supports Linux-only L-models
- Leverage traditional Linux admin skills on Power Systems to administer virtualization
- SAP certification for production use expected in 4Q14
  - Enablement of SAP Monitoring (oscol)
    - via vm-dump-metrics library to be installed in each guest OS
  - Enablement of SAPJVM ongoing

- Supports Redhat, SUSE for SAP Apps. In Linux Guests
- Ubuntu only supported as Desktop by SAP
- Dynamic addition & removal of virtual devices
- Live VM Migration for SAP software stack to be tested
- Managed by PowerVC and open source tools which provides flexible familiar Linux admin tools
## PowerVM vs PowerKVM Comparison

<table>
<thead>
<tr>
<th></th>
<th>PowerVM</th>
<th>PowerKVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA Availability</td>
<td>2004</td>
<td>2Q2014</td>
</tr>
<tr>
<td>SAP Support</td>
<td>2004</td>
<td>Plan 4Q2014</td>
</tr>
<tr>
<td>Supported Hardware</td>
<td>All P6, P7, P7+, P8</td>
<td>L-only PW8 Systems</td>
</tr>
<tr>
<td>Supported OS</td>
<td>AIX, IBM i &amp; Linux</td>
<td>Linux</td>
</tr>
<tr>
<td>Workload Mobility</td>
<td>Supports AIX, IBM i &amp; Linux</td>
<td>Linux</td>
</tr>
<tr>
<td>Basic Virtualization Management</td>
<td>IVM / HMC / FSM</td>
<td>Virtman/libvirt</td>
</tr>
<tr>
<td>Advanced Virtualization</td>
<td>PowerVC/VMControl</td>
<td>PowerVC, Vanilla OpenStack</td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Established Security</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Track Record on Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Source Hypervisor</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Homogeneous SAP Business Suite for Linux on POWER

- The full SAP Business Suite 7 based on SAP NetWeaver versions
  - NetWeaver 7.4
  - NetWeaver 7.0 & 7.3
  - supported on Linux on POWER OSs

- Supported Linux Distributions are
  - SLES 9, 10, 11
  - RHEL 4, 5, 6

- Can reside in traditional PowerVM LPARs and/or IFLs

- Supported Databases are
  - DB2 LUW 9.x, 10.1 & 10.5
  - MaxDB 7.5 ..7.9
  - Oracle 10g – 10.2.0.5
  - Oracle 10g / 11g (SOD) via instant client libraries

* 10g in extended support until 07-2015
Oracle Instant Clients for Linux on POWER

• In March 2014, Oracle released the 10gR2 instant client for Linux on POWER.
  – SAP customers can deploy SAP Application Servers on Linux on Power, and connect them to an SAP DB-Server running the Oracle DB Rel. 10g or 11gR2 on AIX Versions 6 or 7.

• SAP installs using an Oracle DB must always be 3-tier
  – Use PowerVM based consolidation and resource sharing

• In April 2014, Oracle announced plans to support instant Client 11gR2 on IBM Power Systems running Red Hat Enterprise Linux and SUSE Linux Enterprise Server in 2014.
  – The Instant Client version of the Oracle Database will be available on Oracle 11.2.0.4.

• Availability for SAP applications typically few weeks after Oracle GA.
POWER8 Scale-out Systems Show Excellent Scalability

- PoC performed at IBM SAP CC with:
  - SAP Bus. Suite 7
  - 3-tier setup
  - SAP Appl-Servers on Linux on Power (Red Hat Enterprise Linux Version 6)
  - Oracle 11 DB residing on AIX 7 LPAR
  - POWER8 hardware
- Showed ideal scalability in SAP transaction throughput when going from 1 to 3 SAP application servers

Download WP: “SAP Business Suite 7 on Linux on Power with POWER8 Servers using an Oracle Database on AIX”
Memory affinity effect

ERP Transaction Scalability with LoP Scale-Up (para 3-tier)

relative SAP ERP transactions/hour

# of simulated SAP users in 12c-LPAR

1.500 3.000 4.500
SAP Business Suite Supports IFLs on High End Power Systems

• IFLs (Integrated Facility for Linux)
  – Available on Power 770, 780 and 795 systems
  – can significantly reduce **intra-system cost versus traditional pricing** model (=hw MES + cpu/memory activation)
  – No technical, but licensing vehicle. Instead traditional CUoD, activate 4 core/32GB chunks per IFL.
  – Only 70 PVUs vs. 120 PVUs for HE Systems

• IFLs are beneficial for
  – Software / Middleware which is enabled on Linux on Power
  – and has a core/PVU based pricing model
  – and SAP sites who plan to activate spare server resources

• No constraints by SAP applications, but overall Linux on Power Software availability applies, too
  – e.g., SAP DB-Server running Oracle 11 will remain on AIX DB-LPAR

* Version 10.2.0.2 & up
** Version 11.2.0.2 & up
# on POWER7+ SLES 11 only
More Server Capacity through Simultaneous Multithreading SMT4

- Still Memory and Caches are not fast enough to feed POWER7 processor pipelines
  - SMT4 allows 4 threads (programs) to execute in parallel on a single core
- A single physical core will per default appear as 4 logical processors to AIX/Linux and SAP.

- Fully transparent to (SAP) Applications and DBs
  - despite the fact of higher transaction throughput
  - SMT is most beneficial to highly utilized systems

All measurements performed at ≥90% utilization using different SAP workloads
The effect of SMT8 on DB response time
SAP ABAP Application Server Memory Profile

- SAP SD, system with a mix of 4KB and 64KB pages

- Memory references: Each slice represents the % of total memory
  - 0-49
  - 50-99
  - 100-149
  - 150-199
  - 200-249
  - 250-299
  - 300-349
  - 350-399
  - 400-449
  - 450-500
POWER7+ Active Memory Expansion – A great fit for SAP

**CPU Utilization**

- 147% more memory for 20% additional CPU
- 99% more memory for 2% additional CPU

**Throughput**

- Minimal Impact on throughput at 147% memory expansion

**Response Time**

- Minimal impact to response time at 147% expansion

Note 1464605 - POWER7 Active Memory Expansion (AME)  saposcol v12.46

Your results will vary depending on compressibility of the data and available CPU resource.
Potential real memory savings by POWER7 AME for SAP customers

- Real live memory gains by SAP implementations depend on the workload mix.
- Internal and customer tests show an potential expansion factor of factor 2x for ABAP based workloads, about 1.6 for DB-loads.
PowerVM Virtualization System Advisors

- **Virtualization Performance LPAR Advisor**
  - diagnoses performance issues within PowerVM partitions
  - runs within an AIX partition (dedicated or shared)
  - provides reports and recommendations to improve performance (e.g. placement, SMT, processor folding, processor, and memory pool utilization)

- **VIOS Advisor**
  - runs within the customer's VIOS, e.g. some hours
  - provides reports and recommendations to improve VIO performance

- **JAVA Advisor**
  - Not applicable for SAP NetWeaver, since own SAP JVM currently not supported
  - Be aware that SAP will de-support partner JDKs and only support their own SAP JVM starting 2012. Read details: [http://w3-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD105826](http://w3-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD105826)
Sample Outputs from PowerVM Advisors

- Contains sections for detailed environment reporting and checks for current settings

### VIO

![VIO Performance Advisor](image)

### LPAR

![LPAR Virtualization Performance Advisor](image)

<table>
<thead>
<tr>
<th>System Configuration</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server Model</td>
<td>IBM6225-XIB</td>
</tr>
<tr>
<td>Processor Family</td>
<td>PowerPC J8000</td>
</tr>
<tr>
<td>Server Frequency</td>
<td>3330 MHz</td>
</tr>
<tr>
<td>Installed System CPUs</td>
<td>8 cores</td>
</tr>
<tr>
<td>Licensed System CPUs</td>
<td>8 cores</td>
</tr>
<tr>
<td>Installed System Memory</td>
<td>65536 MB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lpar Processor Optimization</th>
<th>Current Value</th>
<th>Recommended Value</th>
<th>First Observed</th>
<th>Last Observed</th>
<th>Risk</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- OK
- Can be improved
- VIOLPAR

<table>
<thead>
<tr>
<th>Lpar Memory optimization</th>
<th>Current Value</th>
<th>Recommended Value</th>
<th>First Observed</th>
<th>Last Observed</th>
<th>Risk</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- NA
- NA

<table>
<thead>
<tr>
<th>Lpar IO optimization</th>
<th>Current Value</th>
<th>Recommended Value</th>
<th>First Observed</th>
<th>Last Observed</th>
<th>Risk</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- NA
- NA
Dynamic Platform Optimizer DPO

Key Features
- Partition placement (memory, virtual CPUs) optimized dynamically to improve affinity
- Available for Power 770, 780, and 795 at no charge
- Operating system agnostic
- OS adjusts to new affinity properties after optimization operation. Full supported with
  - AIX: 6.1 TL8+, AIX 7.1 TL2+
  - IBM i: 7.1

Client /SAP Application Benefits
- Improved performance in a cloud environment
- Consistent transaction dialogue times

SAP support
- As a native POWER feature does not require formal SAP certification
- We expect DPO to behave transparent and improve system behavior, in particular for large Power Systems and instances
- During Re-Allocation of LPARs, SAP performance will be impacted, not apply during prime shift
Dynamic Platform Optimizer Mechanism

- Optimizer is controlled via HMC command-line interface
- Requested/protected partition lists
  - Sets of partitions can be prioritized or protected (untouched) by the DPO operation
- Impacted partitions notified at the end of operations
  - Partitions will re-fetch affinity properties in response to notification
- Hypervisor leverages underlying technology to relocate memory and virtual CPUs
  - Relocation transparent to partitions
  - 10-20% performance degradation to impacted partition while partition memory is being relocated
- Notion of current and potential “affinity score”
  - Enables system administrator to make decisions about value of running optimizer

- CLI “optmem” request
- Determine LPAR priority
- Compute preliminary optimization plan
- Optimize HPTs in LPAR priority order
- Recompute optimization plan
- Reassign CPUs to LPARs
- Optimize partition memory in LPAR priority order
- Notify affected LPAR OSes
Scaled Throughput AIX Processor Folding Controls

New AIX tuning option (schedo) to more aggressively drive higher SMT levels for scaled throughput versus lower SMT levels for raw thread performance.

Folding can improve LPAR and system performance:
- Reduces context switching of cores between partitions across a system
- Reduces context switching of software threads across multiple cores in a LPAR
- Improves overall affinity at both LPAR and system level

Default Processor Folding Approach

Scaled-Throughput Approach – biased for SMT4 (vpm_throughput_mode=4)

As load approaches max LPAR entitled capacity, the behavior converges.

Active Thread
- Width represents thread strength
- Height represents response time
AIX Workload Partitions

• SAP supports WPARs for production systems.
  – Shared system WPARs
  – No resource control
  – DLPARs (Monitoring)

• SAP-Note 1105456 describes supported WPAR environments, prerequisites and restrictions
  – System WPARs only

• WPAR Application Mobility not supported

• Benefits for SAP customers
  – Less administration efforts for AIX maintenance in LPARs
  – Fast to deploy
  – Single memory space = real-time memory virtualization, no DLPAR operations

• Customer testimonial April 2012
  – “Savings up 2.8GB per SAP system, in sum 60GB for landscape”
  – “Down from 21 to only 2 OS environments to be maintained”
  – “Still own environments from SAP application side”!
AIX Workload Partitions

Issues
- patch/fix/upgrade
- QA
- Common tuning
- SPOF

Notes 1105456 & 1380038
### AIX Levels – Support for POWER8 Scale Out

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX 6.1 TL7</td>
<td>SP6</td>
<td>SP7</td>
<td></td>
<td></td>
<td>SP8</td>
<td>SP9</td>
<td>SP10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 6.1 TL8</td>
<td>SP1</td>
<td>SP2</td>
<td></td>
<td></td>
<td>SP3</td>
<td>SP4</td>
<td>SP5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 6.1 TL9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SP1</td>
<td>SP3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 7.1 TL1</td>
<td>SP6</td>
<td>SP7</td>
<td>SP8</td>
<td></td>
<td>SP9</td>
<td>SP10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 7.1 TL2</td>
<td>SP1</td>
<td>SP2</td>
<td>SP3</td>
<td></td>
<td>SP4</td>
<td>SP5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 7.1 TL3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SP1</td>
<td>SP2</td>
<td>SP3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P7 or P6 Modes with Virtual I/O*

*P7 or P6 Modes with Physical I/O Support*

*P8, P7 or P6 Modes with Physical I/O Support*
POWER8 High End E870 and E880

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX 6100-08</td>
<td>SP2</td>
<td>SP3</td>
<td>SP4</td>
<td>SP5</td>
<td>SP6</td>
<td>SP</td>
<td>TL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 6100-09</td>
<td>TL</td>
<td>SP3</td>
<td>SP4</td>
<td>SP5</td>
<td>SP6</td>
<td>SP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 7100-02</td>
<td>SP2</td>
<td>SP3</td>
<td>SP4</td>
<td>SP5</td>
<td>SP6</td>
<td>SP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 7100-03</td>
<td>TL</td>
<td>SP3</td>
<td>SP4</td>
<td>SP5</td>
<td>SP6</td>
<td>SP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIX 7100-04</td>
<td>TL</td>
<td>SP3</td>
<td>SP4</td>
<td>SP5</td>
<td>SP6</td>
<td>SP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- New I/O supported
- Not supported
- Virtual I/O Supported

Exploit POWER8 Systems; Supported in P8 as well as P7/P6 / P6+ modes
AIX 7.1 TL 3 SP 3 Exploitation of POWER8 Features

- **Security Features**
  - Random number generator
  - On-chip crypto
  - In-core crypto

- **Performance Optimization**
  - Transactional Memory enablement for middleware and applications
  - New POWER8 instructions
  - Dynamic Code Optimization (for Java and IBM JIT technology)
  - SMT 8 (SMT 4 as default mode)
  - 24x7 Monitor

- **Virtualization**
  - Compression accelerator (used by Active Memory Expansion)

- **Additional POWER8 features will be exploited in future AIX updates**
AIX Enterprise Edition Content Changes 2Q 2014

AIX Enterprise Edition 2013

- AIX 7 or AIX 6
- WPAR Manager
  + PowerVC
  - PowerSC Standard Edition
  - AIX Dynamic System Optimizer
  - SmartCloud Entry for Power
    - Director Storage Control
    - Systems Director Standard Edition
      - IBM System Director
      - Active Energy Manager
      - Network Control
      - Service and Support Manager
    = VMControl Enterprise Edition
- IBM Tivoli Monitoring

AIX Enterprise Edition 2014

- AIX 7 or AIX 6
- WPAR Manager
- PowerVC
- PowerSC Standard Edition
- AIX Dynamic System Optimizer
  + Cloud Manager with OpenStack for Power
- IBM Tivoli Monitoring
SAP Solution Package IBM PowerHA SystemMirror 7.1

Motivation
- Standardized toolset around the globe
- Support for replicated enqueue scenarios
- Align implementation to SAP recommendations
- Provide SAP specific Best Practices and recommendations

Supported SAP scenarios
- ABAP, JAVA and Double Stack w/o ERS and App (optional)
- Tested for NW7.0, 7.20, ECC6.0, EP6, PI7.1
- 2-tier and 3-tier installations
- Multi-node clusters
- DB2 and Oracle DBs
- HA + DR (PowerHA/XD and SystemMirror Enterprise)

Solution
- Set of documentation covering Storage, VIOS, AIX and PowerHA for SAP HA installation & configuration
- PowerHA configuration
- PowerHA start, stop and monitor scripts
- Distributed for free to IBMers and BPs via request to ISICC Infoservice

Limitation
- manual setup (not automated) of PowerHA accordingly to Documentation
PowerHA SystemMirror Smart Assist

- PowerHA SystemMirror 7.1 or later versions
- AIX - Version 6.1 with 6100-06 Technology level or later
- Available Smart Assist for (DB2, Oracle, MaxDB)
- Smart Assist for SAP

**Smart Assist for DB2**
DB2 UDB Enterprise server edition - 8.1, 8.2, 9.1 or 9.5

**Smart Assist for Oracle**
Oracle Application server 10g Rel 2, 11g Release 2

**Smart Assist for MaxDB**
- SAP MaxDB 7.6 and 7.7
- SAP Live Cache - SAP MAXDB version 7.7.07 or later DSCLI for DS8000

**Smart Assist for SAP**
- SAP NW - 7.0, 7.1, 7.2 and 7.3 version

**Smart Assist features:**
- Wizard for selected setups
- Discovery of running instances
- Automated cluster configuration
- IBM Systems Directors integrated

What is Smart Assist?
Smart Assist for SAP Infrastructure

- Discovers SAP Deployment in the Cluster
  - Varied deployments whether 2 or 3 tier are covered
- Guides customer with HA policy creation
  - Out of the box configuration policies
  - Methods to manage the start/stop of the environment
  - Health monitoring methods
  - Dependency and relationship discovery on other OS resources
- Support for:
  - DB2, Oracle or MAXDB databases
  - Supports policy changes for customized deployments
  - Supports both ABAP and Java Infrastructure

Typical SAP Deployment involves:
- Multiple Compute Servers
- Database instances
- Shared File Systems
- Two tier (Application services and Database reside on the same OS Image) and three tier deployments (Application server and database reside on different OS images)

PowerHA integrated solution: Optimized management interface in SMIT and IBM Systems Director
- Support for 2 or more node SAP clusters
- Exploitation of database smart assists, exploits advanced RG policies
- Robust handling of ERS instance in a 3/more node cluster
End-to-End SAP Landscape Management

IT ADMIN  SAP BASIS

IBM Tivoli Storage FlashCopy Manager

Topology view
Virtualization metrics
Live partition mobility
OS provisioning

PowerVC

Integrated Application and Infrastructure Management
Provided as self-services to the SAP Administrator

SAP Landscape Virtualization Management

IBM Power Systems
IBM Storage Systems
IBM PureFlex System

SAP topology view
SAP clone/copy/refresh
SAP rename
SAP post-copy automation
SAP instance provisioning

Database / storage cloning

PowerVM
PowerVC Virtual Systems Management for PowerVM

Leveraging Power Systems virtualization to provide superior management and optimization

Managing a pool of resources with single system simplicity

Vertically integrated and workload aware...

Image Deployment and Capture

VM Resilience and High Availability

VM Monitoring, Management, Mobility

On-Going Optimizations and Rebalancing

Policy based VM Placement

Security including Isolation and Multi-Tenancy

Key Infrastructure as a Service (IaaS) elements required for Cloud...

Horizontally integrated across server, storage and networking...

Integrated Server, Storage and Network Provisioning and Mobility

Differentiated with deep integration with IBM Power Systems...
PowerVC: Build on OpenStack with IBM Enhancements

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 IVM
- Nova drivers for HMC
- 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

Storage
- IBM and 3rd Party

IBM Power Systems

Network
- IBM and 3rd Party

OpenStack API
- API Additions

Security (KeyStone)
- Scheduler
- Platform
- Projects
- Monitoring
- VM Mgmt

Images
- OVF
- Flavors
- Quotas

AMQP

Block Storage
- Cinder

Storage Drivers

Compute
- Power Driver

Power Systems

Network
- Neutron
- Network Drivers

IBM DB2

DBMS

Projects

Platforms

Quotas

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

Virtualization Management
- Virtualization Management
- Monitoring & Events

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

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 IVM
- Nova drivers for HMC
- 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
PowerVC Standard Typical Deployment
Support for HMC Managed Power Systems

- **Management System Options**...
  - RHEL Linux on a separate x86 server
  - RHEL Linux in a partition on Power

- **Managed System**...
  - Power 6/7/7+/8 Express & Standard HW
  - HMC managed systems via K2 APIs
  - Multiple redundant VIOS servers
  - NPIV attached storage

Manage from Server

**PowerVC**
- RHEL Linux
- x86

**Power System**

**PowerKVM***

**PowerVM**
- Power System
- Power System
- Power System

**HMC**
- MCP Linux
- x86 System

**IT Admin**

**Applications**

**PowerVC Virtualization Management Console**
- OpenStack API
- API Additions
- Security (KeyStone)
- Scheduler
- Platform EGO
- Projects
- Monitoring
- Images
- OVF
- Flavors
- Quotas
- VM Mgmt
- AMQP
- DBMS

**REST APIs**

**SSH / CLI**

**Fiber Channel**
PowerVC 1.2.1 FixPack 2

- RedHat Enterprise Linux 7 client support
- 3rd party supported OpenStack drivers
  - Allows clients to manually register OpenStack storage and fabric drivers into PowerVC
  - Goal is to allow faster access to rapidly evolving OpenStack drivers
  - Caveats:
    - IBM supports PowerVC but not the drivers
    - Native OpenStack storage drivers are rapidly evolving and sometimes unpolished
    - OpenStack drivers may require a newer OpenStack release
- Bug fixes

*General Availability: August 14, 2014*
PowerVC 1.2.2

Available 4Q 2014

• New Storage Support
  – Classic vSCSI
  – XIV Storage
  – Cisco SAN*
  – EMC VMAX Storage*
  – EMC VNX Storage*
  – Image Export/Import PowerVM images
  – Multiple I/O Group support

• New Client supported
  – IBM i client
  – SLES 12
  – Ubuntu V14

• One-Click System Evacuation (aka Maintenance Mode)
• IP pools
• Add/Remove VNIC post-deploy
• Enhanced Auditing

* - Pending vendor driver delivery
Optimization Strategy for OpenStack Infrastructure Software

Strategic IBM Asset for Cloud and Virtualization Management Differentiation

- Intelligent and policy driven Virtual Server Placement
- Supporting use cases for virtual server deployment, relocation and restart
- Optimization for server utilization and energy consumption
- Increased virtual server availability and resilience
- Multi-tenant security isolation

Starting with simple and deterministic policies

<table>
<thead>
<tr>
<th>Optimization Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Packing</strong></td>
</tr>
<tr>
<td>- Pack workload on fewest number of physical servers</td>
</tr>
<tr>
<td>- Maximizes usable capacity, reduces fragmentation, reduces energy consumption</td>
</tr>
<tr>
<td><strong>Striping</strong></td>
</tr>
<tr>
<td>- Spread workload across as many physical servers as possible</td>
</tr>
<tr>
<td>- Reduce impact of host failures, higher application performance</td>
</tr>
<tr>
<td><strong>Load-Aware</strong></td>
</tr>
<tr>
<td>- Allocate physical servers with lowest load to new workloads</td>
</tr>
<tr>
<td>- Higher application performance</td>
</tr>
<tr>
<td><strong>HA-Aware</strong></td>
</tr>
<tr>
<td>- Allocate HA-enabled resources to critical workloads</td>
</tr>
<tr>
<td>- Match availability levels to service requirements and costs</td>
</tr>
<tr>
<td><strong>Energy-Aware</strong></td>
</tr>
<tr>
<td>- Place workload according to energy indices and datacenter hotspots</td>
</tr>
<tr>
<td>- Reduce energy consumption</td>
</tr>
<tr>
<td><strong>Affinity-Aware</strong></td>
</tr>
<tr>
<td>- Place workload close to critical resources such as storage</td>
</tr>
<tr>
<td>- Higher application performance</td>
</tr>
<tr>
<td><strong>Server Model-Aware</strong></td>
</tr>
<tr>
<td>- Allocate resources according to model types</td>
</tr>
<tr>
<td>- Maximize utilization of higher performing &amp; more expensive resources</td>
</tr>
<tr>
<td><strong>Topology-Aware</strong></td>
</tr>
<tr>
<td>- Allocate resources on the same interconnect to the same application</td>
</tr>
<tr>
<td>- Improve application performance</td>
</tr>
</tbody>
</table>
Learn More about PowerVC

PowerVC LinkedIn Group

http://tinyurl.com/linkedinpowervc

PowerVC on Facebook

http://facebook.com/ibmpowervc

PowerVC on Service Management Connect...


PowerVC Hosted Trial – Try out PowerVC in our environment for FREE

http://tinyurl.com/powervctrial
Virtualization/Cloud Management for Power Systems

Manage Virtualization
- Simple UI and Setup
- Resize VMs and Migration
- Capture & Deploy VMs
- Policies for placement
- Manages PowerVM & PowerKVM

Basic Cloud
- Self-Service Portal with Process Automation
- Metering and Billing of Usage
- Catalog of VMs and Images
- Open access to OpenStack APIs
- Manages Hybrid Private Clouds

PowerVC Advanced Virtualization Management

Advanced Cloud
- Capacity management
- Advanced usage metering/accounting
- Virtual system and application patterns
- Runbook Automation
- Manages Hybrid Private/Public Clouds

IBM Cloud Manager with OpenStack

IBM Cloud Orchestrator

Increasing business Options

Increasing Automation & Function
IBM Cloud Manager with OpenStack v4.2*
(formerly SmartCloud Entry)

A cornerstone for IBM Cloud solutions enabling clients to quickly build a cloud

Rethink IT. Reinvent business

- Simplified cloud administration with easy self-service UI
- **Catalog** of standardized virtual machines and images
- **Process automation** for approvals and deployments
- **Metering and billing** reports for charge and showback
- **Isolation** of users and projects through a common portal
- **Choice** of hypervisor and operating system
- **Control point** for public, private and cross-platform OpenStack clouds
- **Open**, extensible and customizable via REST with OpenStack APIs
Enabling Power Systems for dynamic and hybrid cloud

**Private**

On premise Infrastructure
IBM Power Systems

**Dynamic Hybrid**

Variable, dynamic capacity during peak demands

**Public**

Provide clients the flexibility to run applications on or off premise

**Simplified Management**

Deliver a single, secure user interface built on OpenStack APIs, to manage public, hybrid & private deployments

**Platform computing workload management products** LSF and Symphony available today on premise.
Extends to public cloud in hybrid form when SoftLayer offers Power IaaS

**Private Cloud**  
Variable, dynamic capacity during peak demands  
Provide clients the flexibility to run applications on or off premise

**Systems of Record**  
Leverage BlueMix, OpenStack & Cloud Foundry to build services and capabilities aligned with Power’s strategic workload focus

**Systems of Engagement**
Power Systems
Open innovation to put data to work