Integrating IBM Power Systems into a Multicloud Architecture

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POWER9 processor

- 7 TB/s on chip BW
- ~1 TB/s BW into chip
- 1st chip with PCIe4
- 4 GHz peak frequency
- >15 billion transistors
- >24 billion vias
- >24 levels of metal
- >17 miles of wire

Innovation that makes a difference for mission critical applications
<table>
<thead>
<tr>
<th>Enterprise cloud-ready</th>
<th>Number 1 in reliability</th>
<th>Industry-leading value and performance</th>
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<tbody>
<tr>
<td>Power Systems easily integrate into your organization’s private or hybrid cloud strategy to handle flexible consumption models and changing customer needs.</td>
<td>Ranked #1 in every major reliability category by ITIC, IBM Power Systems deliver the most reliable on-premises infrastructure to meet around-the-clock customer demands.</td>
<td>With Power Systems, clients can take advantage of superior core performance and memory bandwidth to deliver both performance and price-performance advantages.</td>
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When data intensive workloads are the bottom line

Built-in PowerVM virtualization, IBM POWER9-based Power Systems are cloud-ready, enabling you to deploy the right cloud environment to meet your needs.
IBM POWER9 Family

When data-intensive workloads are the bottom line

- S922/S914/S924
- H922/H924/L922
- E950
- E980
- LC922/LC921
- AC922

- Mission Critical Data Intensive Workloads for Private Clouds
- Big Data Workloads
- Enterprise AI Workloads

Entry
Midsize
Enterprise
“IBM POWER8-based processor systems and the latest POWER9 servers provide several key feature/function advantages that advance reliability and enable customers to lower Total Cost of Ownership (TCO) and achieve near-immediate ROI.”
IBM Power Systems have security built in at all layers, from processor to the OS, designed to deliver end-to-end security.

IBM Power Systems ranked the most reliable for 10th straight year delivering 99.9996% uptime.*

IBM POWER9 processor drives the world’s fastest supercomputers and is ready to accelerate your enterprise.

IBM Power Systems enable the most data intensive and mission critical workloads in private and hybrid cloud environments.

Proven reliability

Built-in security

Affordably scales capacity and performance

Simple multicloud integration

* ITIC 2018 Global Server Hardware, Server OS Reliability Survey Mid-Year Update. The highest uptime of 99.9996% is calculated based on 2.0 minutes/server/annum unplanned downtime of any non-mainframe Linux platforms.
Enterprises are rapidly adopting multicloud strategies

Now’s the time for a multi-cloud strategy

Why Multi-cloud Architecture is a Winning Strategy in Today’s Cloud Marathon

A multi-cloud strategy is the foundation for digital transformation

Delivering Enterprise Digital Transformation: Multi-Cloud for Agile IT in the Digital Era
What is multicloud?

**Multicloud - Wikipedia**

Multicloud is the use of multiple cloud computing and storage services in a single heterogeneous architecture. This is also known as a Polynimbus cloud strategy. This also refers to the distribution of cloud assets, software, applications, etc. across several cloud-hosting environments.
Cloud has reset IT expectations

Deploy and scale apps rapidly
Pay as you go for what you use
Rapid access to compute resources
Simplified management and metering
Self-service user experience
Continuous infrastructure innovation
Cloud as a set of benefits - not a product
IT teams are defining how Power fits in multicloud plans
Cloud placement considerations for Power workloads

Resilience – stateless or transactional?

Security – are the crown jewels locked down?

Performance – is it there when you need it?

Latency – is a dropped connection fatal?

Predictability – is activity spiky or stable?

Compliance – local/regional/global?

Data sources – publicly-available or protected?
Where do Power workloads belong?

**Public Cloud**
- Backup & archive
- Front office/desktop
- ERP
- Big data & analytics
- Disaster recovery

**Private Cloud**
- Workloads needing low latency to back ends
- Existing database workloads
- Applications with sensitive data
- Data sovereignty / residency
- Regulation-intensive applications
- Information-intensive applications
- Batch processing

**Maintain & Evolve**
- Applications with complex processes and transactions
- Highly customized applications
- Not yet virtualized applications

Enterprise transformation required for cloud adoption

* IBM Institute for Business Value study, “Tailoring Hybrid Cloud” August 2016
Cloud strategic options for Power clients

Simplify Infrastructure Management & Automation

- provision apps with ease and simplicity
- apply internal charge metrics for server usage
- simplify operations of their IT infrastructure

Deliver a “Cloud Experience” to the Business & Increase Agility

- run AIX apps on AIX systems in the Public Cloud
- manage multiple clouds in a unified manner
- modernize existing apps using microservices & new software technologies
- create a self-service cloud experience within the data center

Provide an Innovation Fabric for the Business

- use as much open source software as possible
- build new apps using the latest software approaches
- deploy Cloud & Container apps in a repeatable, continuous DevOps model
- leverage AI technology to create next-gen innovation
- apply internal charge metrics for server usage
Power Cloud solutions address all challenges

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On Premises (Private Cloud), Off Premises (Public Cloud) or Both (Hybrid Cloud)

IBM PowerVC
IBM Capacity on Demand
Enterprise Pools
IBM Hyperconverged/Nutanix Cloud Management Console

IBM Public Cloud
IBM Cloud Private
Multicloud Manager
Cloud Automation Manager
VMware vRealize Automation & Ops

IBM Public Cloud
IBM Cloud Private
Red Hat OpenShift on Power
IBM PowerAI
Power offers a diverse range of cloud strategies

**Business need:**
- Increase flexibility, competitiveness and reduce costs

- **Private (IaaS)**
  - Enterprise Pools
  - Capacity on Demand
  - Cloud Management Console

- **Public (IaaS)**
  - IBM Power Virtual Server on IBM Cloud

- **Partner Clouds**
  - IBM Power Virtual Server on IBM Cloud

**Business need:**
- On-premises, cloud-like provisioning, agility, simplicity

- **Private (IaaS)**
  - IBM Power Virtual Server on IBM Cloud

- **Public (IaaS)**
  - IBM Hyperconverged Systems (Nutanix)

**Business need:**
- AIX, i, Linux workloads on Power in Public Cloud

- **Private (PaaS)**
  - Partner Clouds (Skytap, Nimbix, ++)

- **Public (IaaS)**
  - Google Cloud Power Infra.-as-a-Service

- **IBM Cloud Private**

**Business need:**
- Modernize existing apps, build new cloud-native, AI apps

- **Private**
  - IBM Cloud Private

- **Public**
  - Red Hat OpenShift

**Business need:**
- Simplify management of multiple clouds (private & public)

- **MINI-CLOUD**
  - VMware vRealize

- **MULTI-CLOUD**
  - IBM Multicloud Manager

**We’ll meet you where you are ... and help you get to where you want to be!**

- Discovery workshops
- Cloud workshops
- IBM Garage services
- Lab Services implementations
- Power Development Cloud
- Power Systems Entry for ICP
- Power to Cloud Rewards
- Cloudcare funding for PoCs
With the generational shift to POWER9 technology, the entire virtualization/cloud stack has been refreshed:

- **Hypervisor**: PowerVM 3.1 (with 4x faster LPM!)
- **Virtualized I/O**: VIOS 3.1
- **Virtualization Management**: NovaLink 1.0.0.14
- **Hardware Management**: HMC/vHMC V9R1M930
- **Private Cloud Management**: PowerVC 1.4.3
- **Multicloud Management**: vRealize Operations v7
PowerVM is included with all cloud-enabled POWER9 servers.

Every Power9 workload is virtualized, mobile and fully cloud-enabled.
Power Enterprise Pools 2.0

Shared Utility Capacity across a pool of Power E980 systems
- Purchase System and Base capacity
- Variable demand addressed by purchasing Capacity Credits for Metered capacity
- Cloud Management Console with HMC automatically tracks and debits against Capacity Credits based on actual usage

Base and Metered Capacity
- Processor activations
- Memory activations
- AIX and IBM i licenses

Usage tracked by the minute via Cloud Management Console
Cloud Management Console (CMC)

— Cloud Management Console (CMC) is a SaaS-based management offering that provides a consolidated view of Power-based deployments, spanning multiple systems, regions and datacenters.

— CMC provides a comprehensive inventory of systems and virtualized resources, consolidated performance data to optimize utilization and performance across multiple Power-based data centers, and aggregated logging information for additional insights.

— Delivered as a SaaS offering available from the IBM Cloud, CMC offers a convenient pay-as-you-go multi-cloud management solution. A CMC entitlement is included with E950 and E980 servers.
CMC connects multiple HMCs to the Cloud

Cloud-based micro-services that can be accessed securely, anytime, anywhere for your complete enterprise

As data centers scale out and up, there’s an increasing need for a complete view of the infrastructure.

- View all Power Systems, HMCs, VMs, etc. across your entire enterprise
- See basic health & state

Inventory Aggregation

- Aggregated performance across Power enterprise
- Energy monitoring
- OS metrics

Performance Monitoring

- Log aggregation
- Telemetry

Log Trends

- Patch compliance reports for firmware, HMC, NovaLink, VIOS and OS
- Scheduled maintenance plan management

Patch Planning
# PowerVC: Three Editions Tailored to Client Needs

**PowerVC API provides integration with Multicloud management and Cloud-Native management solutions**

## Key Features:

### PowerVC Standard Edition
1. Deploy VMs in minutes
2. Full lifecycle management of VMs
3. Automated VM recovery
4. Single-click host evacuation
5. Automated cloud optimization
6. Multi-tenancy and resource isolation
7. Software-defined networking
8. OpenStack API enablement
9. Open upward integration for multi-cloud managers

### IBM Cloud PowerVC Manager

1. **EVERYTHING in PowerVC Standard Edition!**
2. Self-service, single-click deployment for cloud users and developers
3. Policies, metering and quota management to govern how the private cloud operates
4. Import/export VMs to/from clouds

### IBM Cloud PowerVC Manager for SDI

1. **EVERYTHING in Cloud PowerVC Manager!**
2. Integrates IBM Spectrum Scale (Data Management Edition 5.0)
3. Software-defined storage and compute capabilities
4. Enables SDE solutions such as SAN-less private clouds
PowerVC: The ‘Face’ of Power Virtualization and Cloud

PowerVC provides comprehensive virtualization and cloud management for Power servers, enablement for software-defined infrastructure and integration with multicloud managers.
PowerVC Self-Service Cloud User Experience

Cloud PowerVC Manager provides a simplified user experience for developers or other Power private cloud users requiring self-service VM provisioning and management.

The PowerVC self-service portal provides cloud users with capabilities that include:

- One-click deploy templates
- Approvals and expirations
- Role-based access control
- Project-based resource isolation (multi-tenancy)
- Metering and e-mail notifications
PowerVC enables VM import/export for cloud mobility

Move any VM between clouds or data centers as needed, for seamless hybrid cloud agility
Public Cloud Solutions on Power Systems

**Business need:**
AIX, i, Linux workloads on Power in Public Cloud

**Public (IaaS)**
- IBM Cloud
  - Power Systems Virtual Server
- IBM Cloud Next Gen
  - Accelerated Virtual Priv. Cloud
- Google Cloud
  - IBM Power Systems for Google Cloud
- Partner Clouds
  - (Skytap, Nimbix, +++)

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**Global community of Partner managed Power Clouds including AIX, IBM i and Linux – with broad range of choices from on-demand to managed to hosted**

**AIX and IBM i – available on-demand and pay-for-use by the Hour**

- Linux on Power Virtual Server Instances with and without GPUs' in IBM's Virtual Private Cloud for security, performance and scale
- AIX, Linux and IBM i on Google Cloud – available on-demand and predictable pricing

**We’ll meet you where you are …. and help you get to where you want to be!**

**Choice and Flexibility to Support Your Needs**

- Discovery workshops
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- Power Developer Cloud
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- Cloudcare funding for PoCs
Power infrastructure supporting the rise of multicloud

- Comprehensive on-premises and off-premises IBM and industry Cloud platform options available to clients
- Cloud platforms can encompass multiple architectures (Power, Z and x86) and hypervisors
Power Virtual Servers on IBM Cloud

Summary:
- AIX and IBM i Virtual Servers available on-demand, priced monthly
- Flexible sizing with sliding scale configuration for number of cores, type of cores (dedicated / shared), memory, storage, etc.
- Purchase through the IBM Marketplace, API enabled for programmatic fulfillment of established contracts
- Systems exist in IBM Cloud colocation site; DirectLink services available for integration with on-prem and other IBM cloud resources

Best fit for:
- Clients looking for hybrid cloud flexibility for Power hardware
- Clients looking to lower costs and continue to leverage existing skills
- Clients wanting to off-load some OS and infrastructure management
- VARs, ISVs and MSPs looking to resell, hosting or managed services

Typical Use Cases:
- Dev/Test environment
- Temporary compute for cyclical spikes in demand
- Move business critical apps to the cloud for hybrid cloud flexibility
- HA/DR on cloud as alternative to second datacenter
- Backup to the cloud for archive of less frequently accessed data
- Host AIX and IBM i apps as a Service (ISVs, VARs, MSPs)

Multi-tenant, self managed, Power compute as-a-service in IBM Cloud with consumption-based OPEX pricing
IBM Power Systems for Google Cloud

**Overview**

Power Infrastructure as a service

Capacity via monthly subscription

A GCP-aligned user experience

Private, low-latency access to GCP resources

IBM runs infrastructure, clients manage OS and up

One consolidated monthly bill by Google Cloud
Enterprise Cloud Ready: IBM Cloud Private

• Secure, enterprise-grade services and operations
• Large and growing ecosystem of application runtimes, software, data and other value-added services
• Supports Power, Z, x86 heterogeneous clusters

IBM Cloud

• Faster insights for cognitive applications
• Better performance at lower cost
• Seamless modernization for AIX and IBM i apps
• Easiest heterogeneous cloud to install and operate

IBM Cloud Private on Power Solution Overview

**Cognitive Systems Infrastructure**
Optimized for the IBM Cloud Private Platform

- Modernize existing applications; integrate with enterprise data
- Faster and more scalable modern databases
- 43% Lower Solution Costs, Save up to $2M/rack
- Faster Insights for more productive Data Scientists and Analysts
- Train 4x Faster on Best GPU Centric Server for AI

**Strategic Value:**
- Self-service catalog
- Agility, scalability, and elasticity
- Self-healing
- Enterprise security
VMware vRealize for Power

Unify apps to infrastructure management across Power, x86 and Z environments

vRealize Automation

Lifecycle management of VMs for AIX, IBM i and Linux on PowerVM or KVM

vRealize Operations

Datacenter operations management platform to unify apps to infrastructure management across private, public and hybrid clouds
vRealize Automation: Manage Power, Z and x86 VMs

- vRealize Automation provides an integrated multicloud management experience.

Platform as a Service (PaaS) capability extended with IBM GTS patterns for implementing IBM and non-IBM application software.

Infrastructure as a Service (IaaS) capability with lifecycle management of VMs for AIX, IBM i and Linux on PowerVM or KVM and Linux on z/VM or KVM on z.
VMware vRealize Operations for IBM Power delivers efficient capacity management, proactive planning and intelligent remediation, helping customers optimize, plan and scale multicloud deployments.

- **Full stack dashboard**
  - HMC data provider
  - PowerVC data provider
- **AIX OS agent (7.1 and 7.2)**
- **Linux OS agent (RHEL and SUSE)**
- **SAP HANA management pack**
- **DB2 management pack**
- **Oracle management pack**
vRealize Operations for Power: Integration with PowerVC

Seamless virtualization management: Environment Overview shows Power server stack with drill-downs to monitor all virtualized resources
Value of VMware vRealize Operations for Power

VMware vRealize Operations for IBM Power Systems helps IT administrators…

Run production operations across large, complex, heterogeneous and hybrid environments

Use an open and extensible platform with scalability and resilience

Create a single pane of glass for data center management across x86 and Power hardware

Customer Benefits

**Improved Efficiency**
Increase the efficiency of IT staff and the utilization of IT resources, reducing both operational expenditure and capital expenditure.

**Unified Visibility**
Streamline and centralize operations with comprehensive visibility from applications to infrastructure and across private and public clouds in a single platform.

**Reduced Downtime**
Proactively identify and solve emerging performance issues and bottlenecks with predictive analytics, ensuring optimum performance and availability.

**Business / IT Alignment**
Provide transparency into the operations and cost characteristics of IT services to better align IT and business.
POWER9 Servers: Optimized for a multicloud world

Optimized for private, public, hybrid and multi-clouds

- Built-in **PowerVM**, so every workload is virtualized with accelerated **secure mobility**
- Consistent enterprise-wide multicloud management with **VMware vRealize Suite** integration
- **Cloud PowerVC Manager** included, for virtualized resource optimization and a private cloud portal
- Create new Power cloud-native solutions alongside AIX, IBM i with **IBM Cloud Private** suite of DevOps tools and app store

**Additional POWER9 Cloud benefits**

- Easy transfer of VMs between clouds
- Enterprise Pools for live resource reallocation
- Cloud-ready images for most Power software
- Broader term license and SaaS pricing options
- LPM trials for legacy servers speeds migration
- Services: Power to Cloud Rewards Program
Thank You