

# AIX / IBM i on IBM Cloud

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**Cognitive Systems**

# Problem Statement

## IBM's Business Problem

Summary:

**Cloud capabilities have become a prerequisite for consuming IT resources. Power has a large client base that relies on AIX or IBM i but IBM Systems does not have AIX / IBM i capabilities in cloud today.**

Power Infrastructure:

Power as an on-premise offering is scalable, resilient and production-ready.

Cloud Capabilities:

Op/Ex, self-service, fast delivery, elasticity, connectivity to x86 and other cloud services

## Power Systems Value



Offering	Description	Consumption	Management
<u>POWER8 Bare Metal</u>	Dedicated bare metal 1 socket, 8/10 core systems available in Dallas, TX. Ubuntu 14	Monthly	SoftLayer IMS Managed
<u>PowerAI in IBM Cloud</u>	On-demand access to GPU supported PowerAI framework	Hourly	PaaS and IaaS, easy access to PowerAI environment
<u>IBM Cloud Skytap Services for AIX</u>	Skytap hosted and managed service sold by IBM, available in NA, EMEA and planned to expand globally	Monthly, with annual contract	Fully managed environment, built in response to client demand
<u>IBM Cloud Managed Services for IBM i</u>	Custom-built in response to client demand; Limited GEO availability, more locations planned	Monthly, with annual contract	Fully managed environment, built in response to client demand
<u>POWER9 with GPUs*</u> *Coming in 3Q 2019	Foundation for GPU-accelerated services in the IBM Cloud; Containerized services coming later	Hourly or monthly	Fully supported infrastructure; services client-managed

## IBM Cloud Roadmap for Power Systems

Today	2Q 2019	3Q 2019	2020
<b>IBM Cloud Private</b>	<b>IBM Cloud: AIX &amp; IBM i</b>	<b>Next Generation Cloud</b>	<b>Next Generation Cloud 2.0</b>
<p>Open, supported Linux Kubernetes with containers</p> <p>Integrate and manage existing AIX/IBM i VM apps</p> <p>Fully supports all POWER8 and POWER9 servers</p> <p>Modernize existing apps and create new cloud native apps with the fastest DBs in the industry</p> <p>Infuse AI and cognitive apps with the fastest GPU accelerated servers in industry</p>	<p>Runs the most demanding IBM AIX and IBM i applications with complete equivalence to on-prem with FC-based SAN</p> <p>Integrated into the IBM Cloud experience for purchasing and managing VM, network and storage</p> <p>Tie into other IBM Cloud resources via direct link</p>	<p>Scale Out P9 with GPUs fully integrated into next Gen</p> <p>x86 &amp; POWER: same Virtual Private Cloud (VPC) function for Linux VM, container, storage, and networking</p> <p>Integrated in IBM kubernetes service (managed)</p> <p>Supports hosted IBM Cloud private &amp; rich app catalog</p>	<p>Scale-Up P9 w/ AIX and IBM I</p> <p>Fully integrated into Next Gen cloud and storage</p> <p>Same VPC experience for PowerVM, storage and networking</p>

# IBM Solution

## IBM Offering

Offering Name:

# IBM Power Systems Virtual Server on IBM Cloud

Offering Description:

A user can purchase an AIX or IBM i Power VM-based Virtual Machine-as-a-Service on IBM Cloud. IBM manages up to OS deployment and the client self-manages the OS and up. Our users can purchase the offering through Cloud consumption-based pricing plans available through IBM Cloud Catalog.

MVP Offering:

Systems: **S922 or E880**

Compute: **0.25-143 cores (15 for S922, 143 for E880/980), Dedicated or Shared option**

Memory: **8-64 GB per core**

Storage Type: **Type: Tier 3 (HDD) or Tier 1 (SSD)**

Storage Quantity **10 GB minimum / 2 TB maximum per disk, 10 GB increments**

Network: **Public and/or Private IP**

OS: **AIX / IBM i**

## IBM Offering Costs

US Hourly	US Monthly	Metric	Element
\$0.161	\$117.69	per core per month	Scale Out Shared (S922)
\$0.645	\$470.74	per core per month	Scale Out Dedicated (S922)
\$0.434	\$316.85	per core per month	Enterprise Shared (E880)
\$1.736	\$1,267.38	per core per month	Enterprise Dedicated (E880)
\$0.015	\$11.11	per GB per month	Memory (std price)
\$0.023	\$16.67	per GB per month	Memory (High Use, >64GB/core)
\$0.040	\$29.00	per core per month	AIX Small
\$0.108	\$79.00	per core per month	AIX Medium
\$1.370	\$1,000.00	per core per month	IBM i OS P10
\$3.014	\$2,200.00	per core per month	IBM i OS P30
\$0.548	\$400.00	per core per month	IBM i LPP P10
\$1.205	\$880.00	per core per month	IBM i LPP P30
\$0.00027	\$0.200	per GB per month	Tier 1 Storage (SSD)
\$0.00014	\$0.100	per GB per month	Tier 3 Storage (HDD)



Offering Name:

# IBM Power Systems Virtual Server on IBM Cloud

Offering Summary:

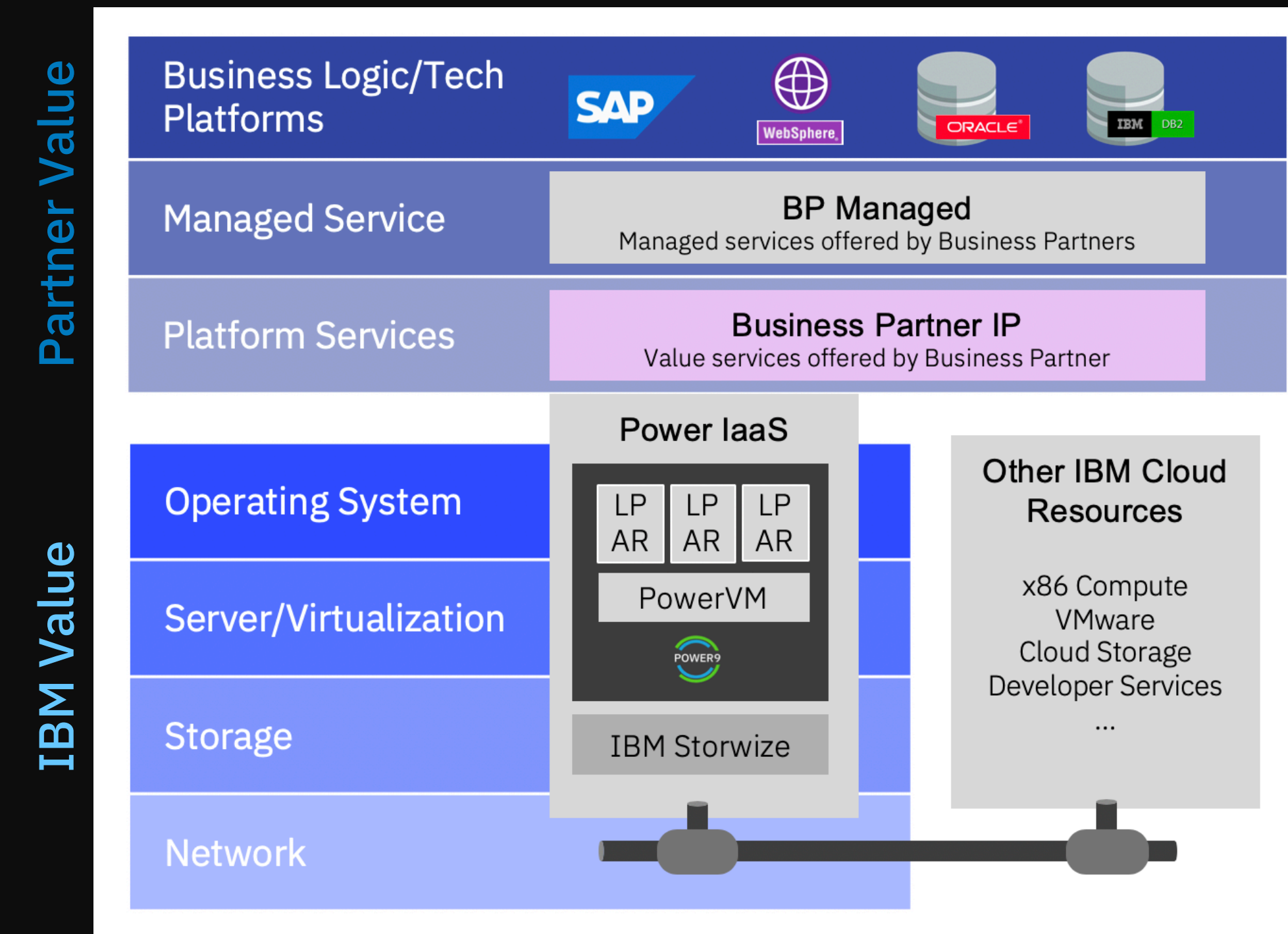
- Power and IBM Cloud co-owned offering through IBM Marketplace
- S922 and E880/E980 based virtual systems with v7K based storage
  - Power compute as-a-service

Offering Logistics:

- Client purchases through the IBM Marketplace w/ UI or via scripts for larger/internal contracts – extend geographical reach and scale of existing partner solutions built on IBM Power Systems
- Flexible offering – Client selects # cores, type of cores, storage, Operating System, etc.

Offering Timeline:

- WDC and Dallas PODs in 2Q19
- Expand to Europe (Frankfurt) in 3Q
- Continue expansion into GEOs and increase capacity in existing PODs as demand drives



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

# Offering Roadmap

- Availability
- Specifications

Q2  
'19

Q3  
'19

Q4 '19 - 1H2020

## (May) Beta in WDC

- US East availability (Washington DC)
- E880 and S922 LPARS (PowerVM based) w/ IBM storewide v7000 storage (SSD and Disk)

## (June 15) General Availability (US East / South)

- US East and South (Dallas) availability

## Post-GA Geo Expansion

- September Frankfurt availability (Multi Datacenter HA)
- E980 available in FRA

## Post-GA Functionality

- Terraform Provider

## Post-GA Compliance

- HIPPA Readiness

## Geo Expansion

- Consequent rapid expansion into other Geos (UK, TOR, AP and beyond)

## Future Functionality

- Integrated DRaaS
- Backup as a service
- Linux on PowerVM

## Future Compliance

- SOC2
- ISO 27001

# Personas

## Personas

### AIX/ IBM i

Current Customers

#### Use Case:

Wants to upgrade or expand their options to deploy on-premise and off premise.

#### Client Need:

- Disaster Recovery as a service
- Dev test environments
- Partially **move IT infrastructure** to the cloud
- Justify the capital cost to refresh especially as the boxes get more powerful to only use half a box

### MSPs/CSPs

Managed Service Provider/ Cloud Service Provider

#### Use Case:

Wants this to **offer the service** to their customers.

#### Client Need:

- Be able to service their customers that want a cloud option and it gives them the ability to provide different or new services
- Looking to get out of the game of buying and hosting their own data centers, it leads to better economic model.

### ISVs

Independent Software Vendors

#### Use Case:

Wants to **host and create** a SaaS offering.

#### Client Needs:

- An **infrastructure to take to their SaaS to customers quickly** without needing to deploy infrastructure
- **Taking advantage of the GEO footprint** that they get from the Cloud
- Looking to **leverage IBM cloud to expand** into additional markets
- **Reduce or distinguish development costs** by removing the physical infrastructure costs

## Personas

### AIX/ IBM i

Current Customers

#### Use Case:

Wants to upgrade or expand their options to deploy on-premise and off premise.

#### Client Need:

- Disaster Recovery as a service
- Dev test environments
- Partially **move IT infrastructure** to the cloud
- Justify the capital cost to refresh especially as the boxes get more powerful to only use half a box

### Pain points:

1

Feeling limited in an infrastructure that **can't quickly and economically scale.**

2

Total changes to infrastructure inherits **added risk in migrating critical workloads.**

3

IT skills with **AIX/IBM i expertise are more rare** in the field

**1 Pain point:**

Limited in an infrastructure that **can't quickly and economically scale.**

*Grow at your own pace.*

## **Consumption Model**

**Selling point:**

Customers that have normally relied with on-premise solutions can now scale their infrastructure as they need without committing to large investment and dealing with long procurement processes that are tangential to them.

**2 Pain point:**

Total changes to infrastructure inherits **added risk in migrating critical workloads.**

*Your workload where you want, when you want.*

## **Hybrid Cloud Flexibility**

**Selling point:**

This allows them to not only stay competitive with the scaling of their infrastructure but also flexible with the management of their workloads both on and off premise. They can move core on-premise activations to the cloud to bring more capacity to their on-premise infrastructure.

**3 Pain point:**

IT skills with **AIX/IBM i expertise are more rare** in the field

*Invest in the future of your workforce.*

## **Modern IT Skillsets**

**Selling point:**

These same customers that have had to accomodate for rare AIX / IBM i IT skillsets can now work with a contemporary model and more easily fill human resources to scale with their infrastructure.

## Partner Opportunity

### Major customer pain points and opportunities:

- Power Hardware refresh cycle (Power 6, 7 server)
- SAP HANA 2025 deadline
- AIX version end-of-life (v5, v6)
- Customer dwindling AIX and IBM i resources and skillset

### Business Partner Opportunities:

- **Value-add services** – migration services, design and implementation services for back-up, HA and DR (resiliency).
- **Managed services** – fully manage customer SAP, Oracle and other enterprise application on top of IBM provided infrastructure
- **ISV** – extend geographical reach and scale of existing partner solutions built on IBM Power Systems
- **Resell** – resell IBM Power infrastructure, upsell IBM Cloud services

### Annual Contract Value (ACV):

- \$500k-\$1M infrastructure

*Target Business Partners:*

## ISV

Independent software vendor building & selling IP on Power platform

## Systems Integrator

Transforming customer IT  
(SAP, Ent. Apps)

## MSP

Managed Service provider providing services on top of customer infrastructure

# Use Cases



## Use Cases

### Critical Workloads

Migrating mission critical workloads

#### Description:

Move a critical workload into the cloud from your on-prem infrastructure.

### Testing Environment

Development testing

#### Description:

Use the cloud as test environment for anything your business will be running on-prem.

### Disaster Recovery

Security planning for on-prem and cloud workloads

#### Description:

Use the cloud as a DR site or have your Cloud workloads set up with another Cloud site for DR.



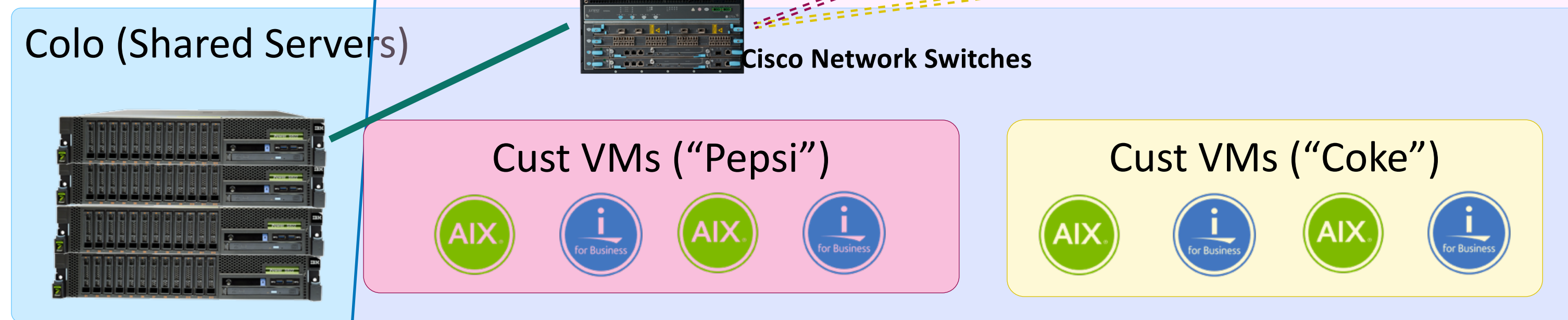
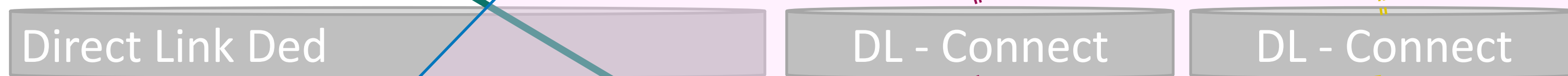
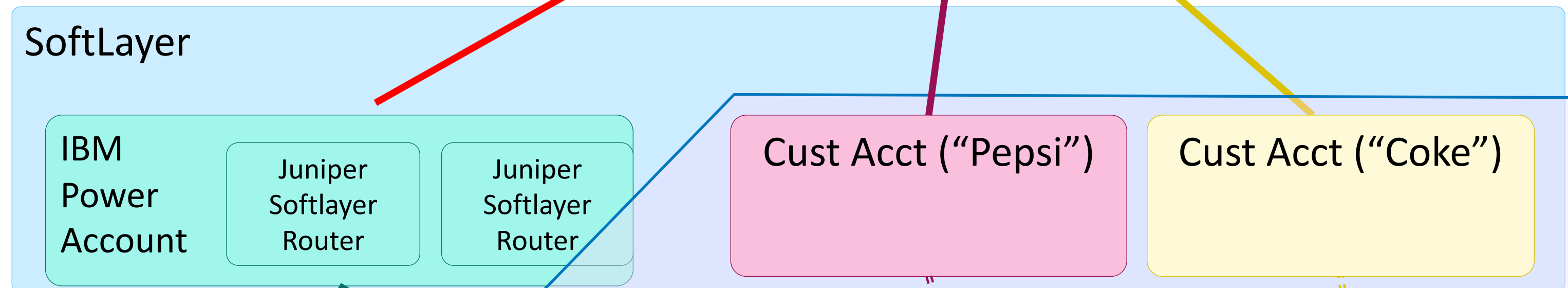
# Networking

# IaaS-Lite Network Overview

## Overview

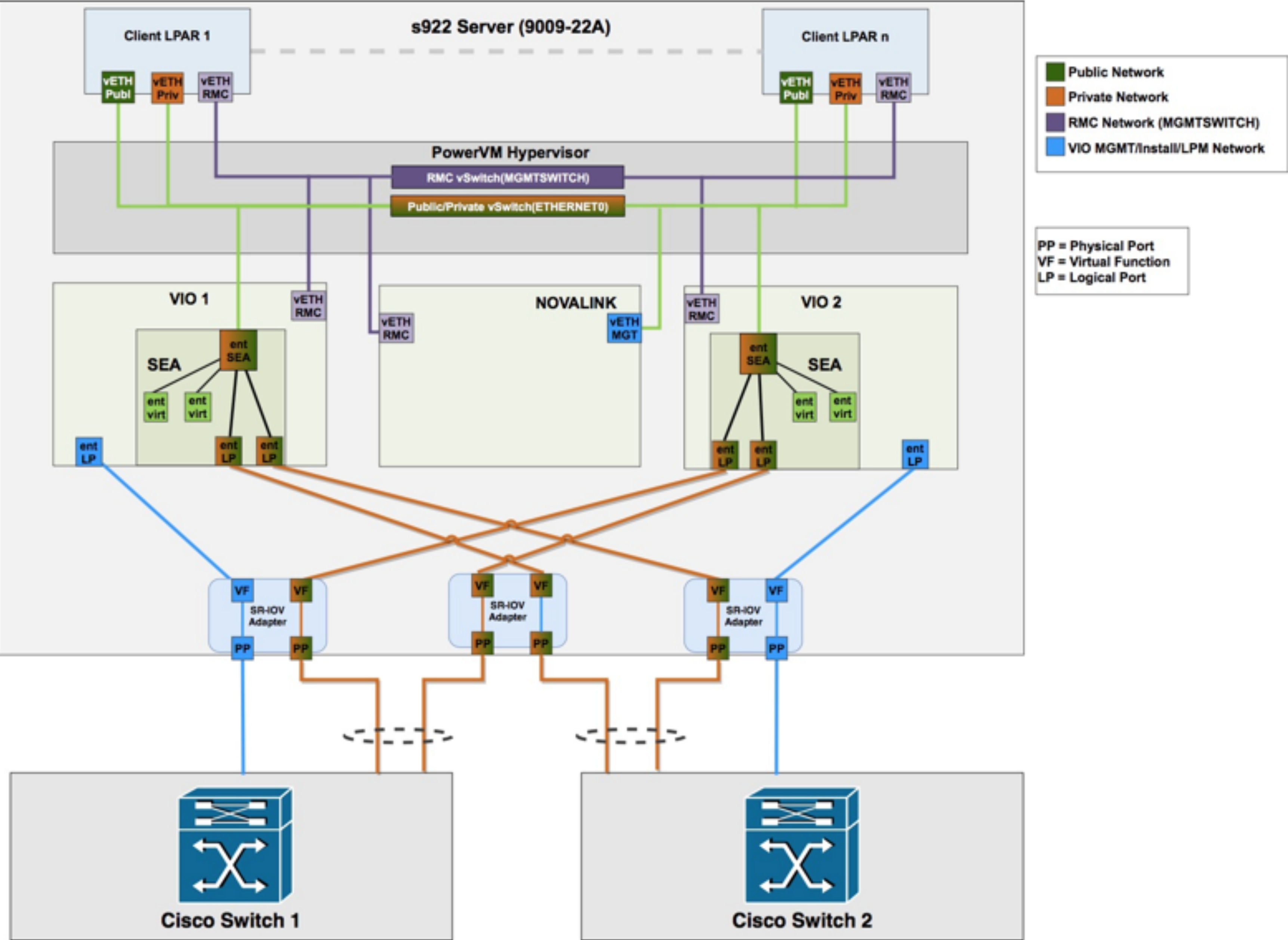
Each VM is deployed with 2 or more NICs.

- public – for quick connectivity via Internet. Uses IBM Cloud Router.
- private – Enables customers within CoLo Network to connect to IBM Cloud Customer Account Network.
  - IBM DirectLink “Connect” is used for the connectivity.
  - Customers order Direct Link Connect on IBM Cloud Portal.
  - This is a key capability to provide secure internet connection and access to all cloud resources.



PowerVM  
VIOS/SEA

# S922 LPAR Network Configuration





# Hardware

## Hardware Overview

### Management:

2 x HMC 7063-CR1 (Power 8)

2 x IBM 821LC:

- 20 x Power8 Cores
- 512 GB Memory

### Compute:

2 x Power e880 (9080-MHE):

- 160 x Power8 Cores
- 9 TB Memory
- 8 x 16 Gigabit PCI Express Dual Port FC
- 10 x 10 Gb Ethernet-SR PCI Dual Port
- SAN HDDs for VIO and NOVA

8x Power s922 (9009-22A):

- 20 x Power9 Cores
- 256G Memory
- 2 x 16 Gigabit PCI Express Dual Port FC
- 3 x 10 Gb Ethernet-SR PCI Dual Port

### Storage:

1 x Storwize V7000F dual Controller:

- 8 x 1.6TB 2.5 Inch Flash Drive

1 x Storwize V7000 dual Controller :

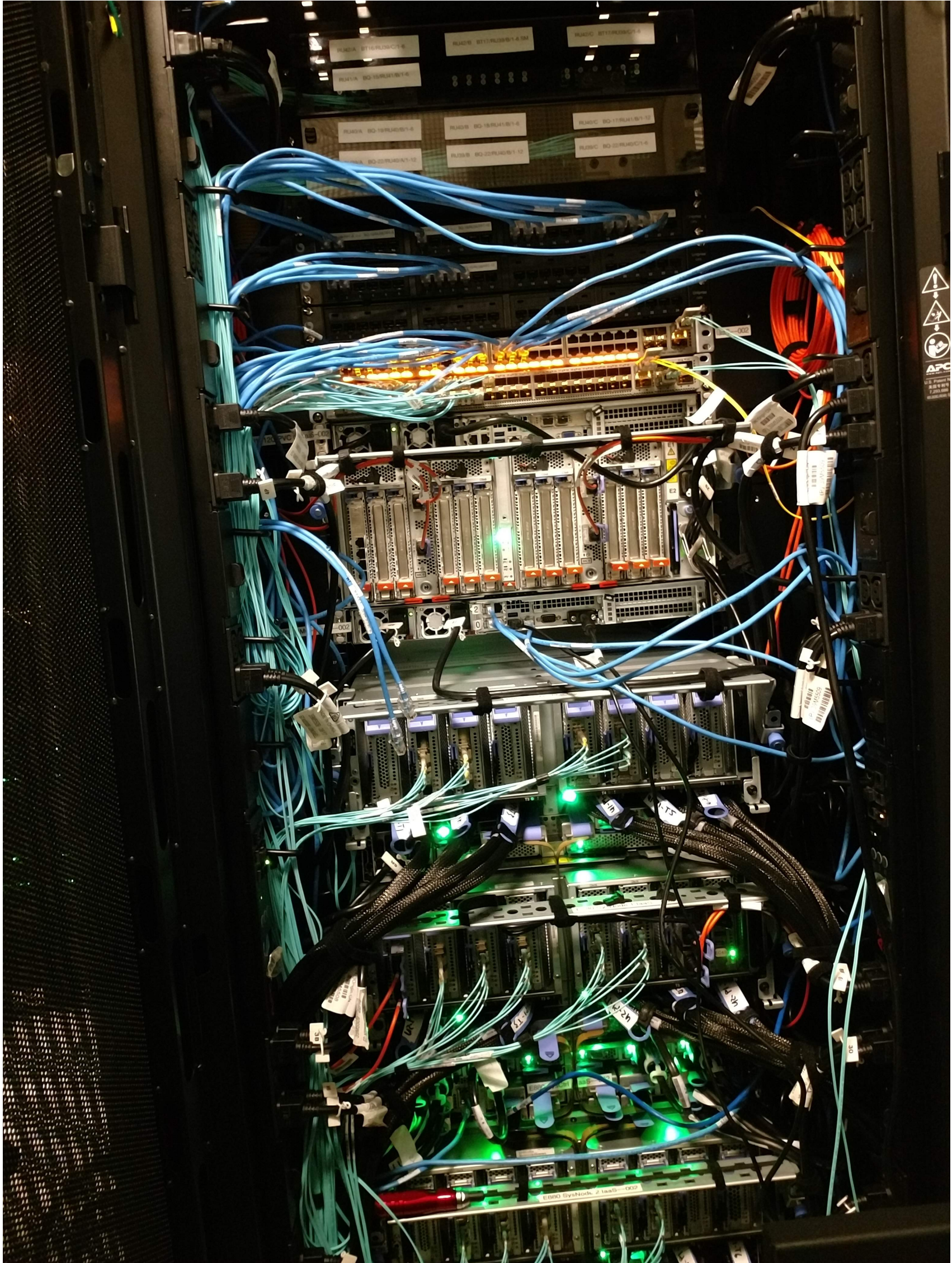
- 72 x 1.8 TB 10K 2.5 Inch HDD

2 x IBM SAN48B (Brocade)

### Network:

4 x Cisco Nexus N9K-C93180-EX-B24C (10G)

# Pod and Rack

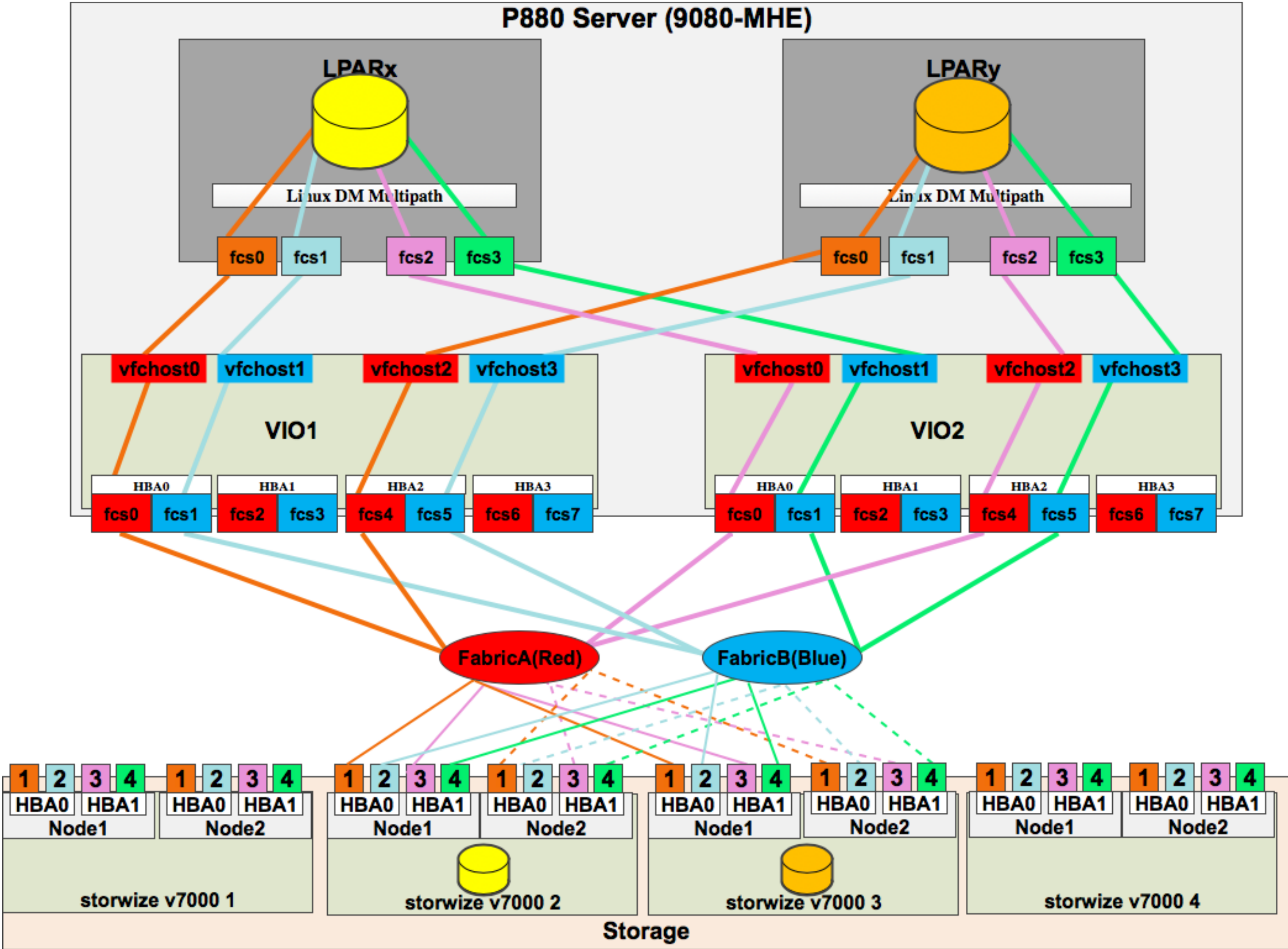




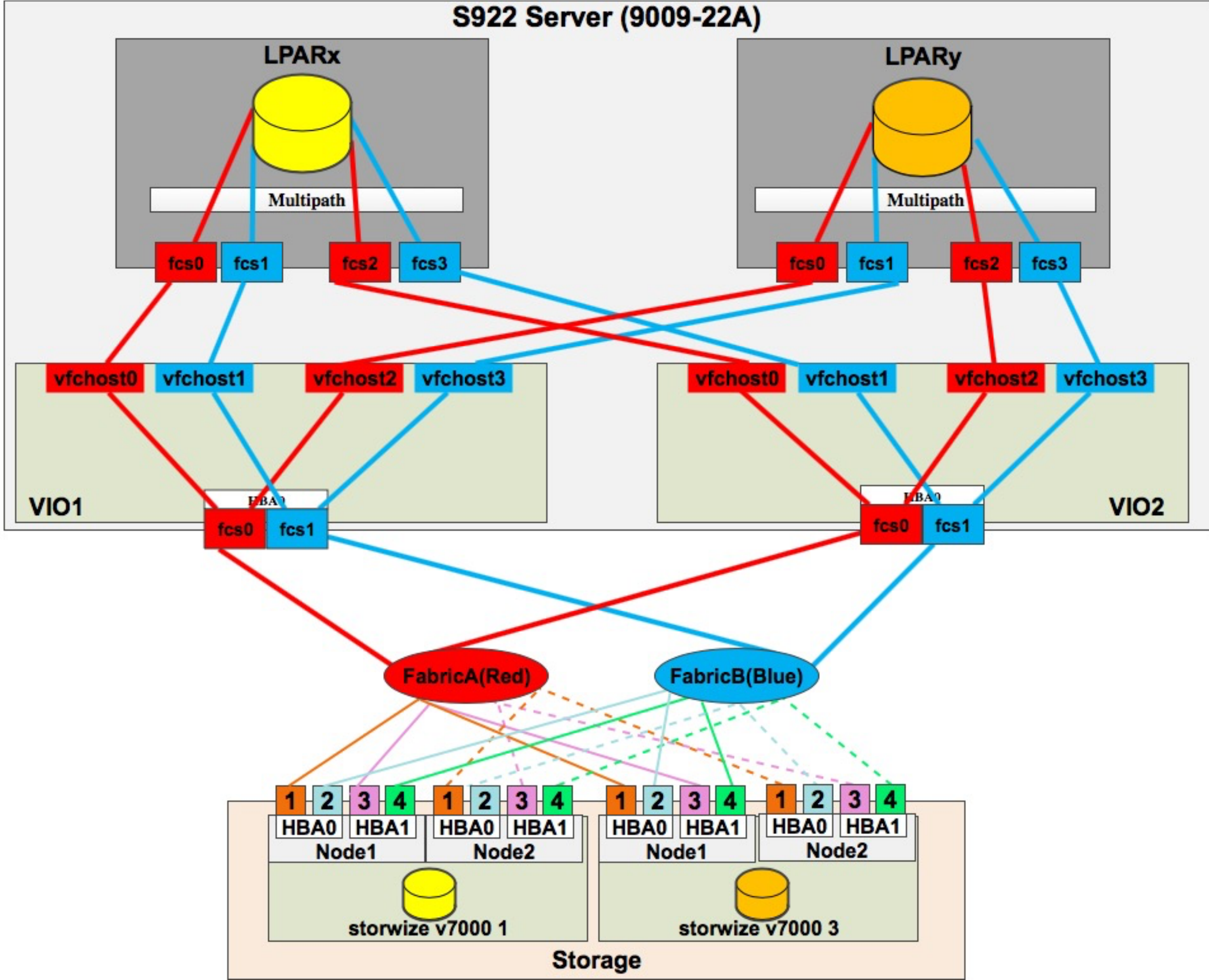
# Storage



# E880 LPAR NPIV Storage Configuration



# S922 LPAR NPIV Storage Configuration





# BCDR

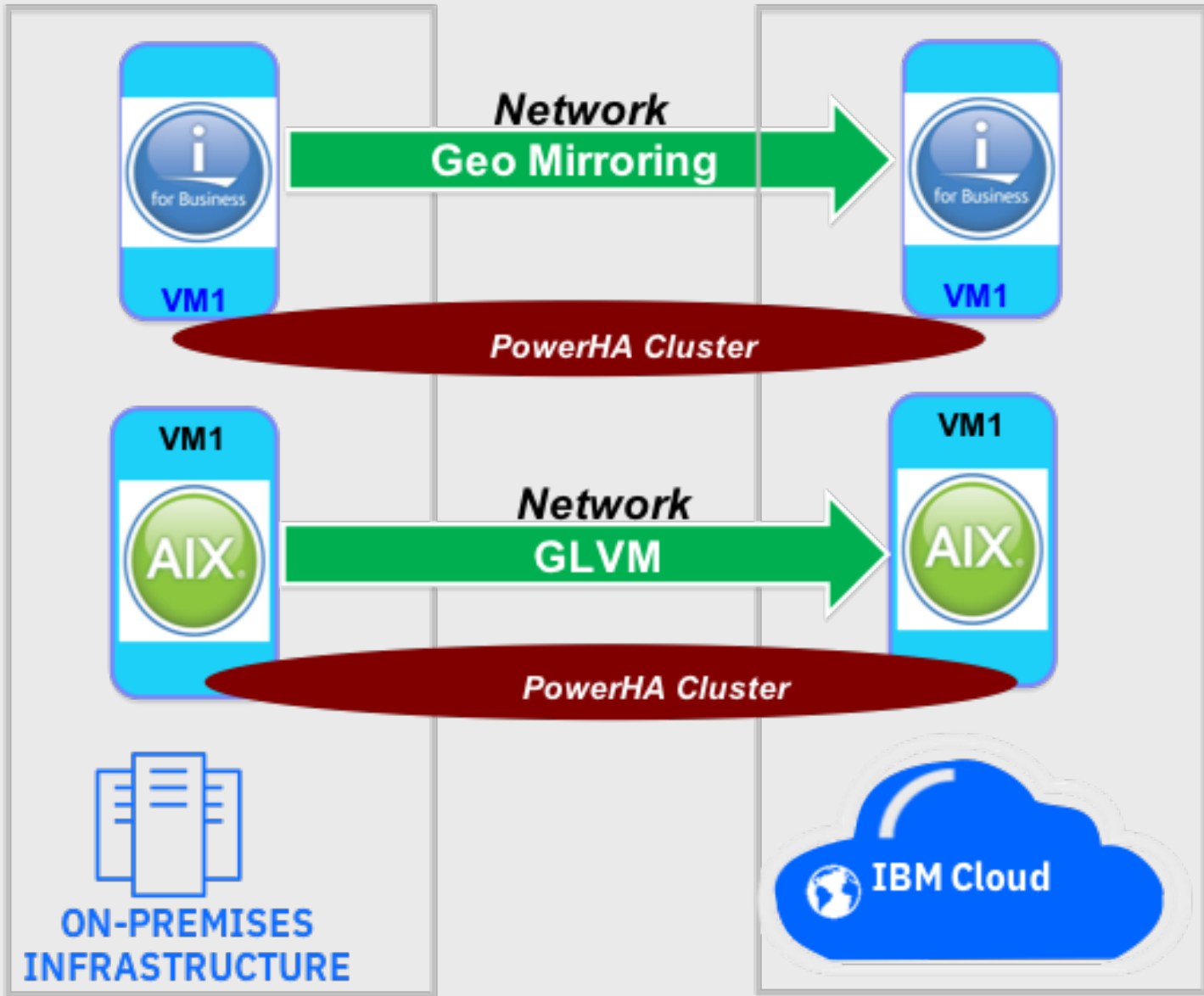
# Disaster Recovery using OS-based mirroring

**Scenario-1:** Customer can use OS capabilities to setup DR backup site in Power public cloud

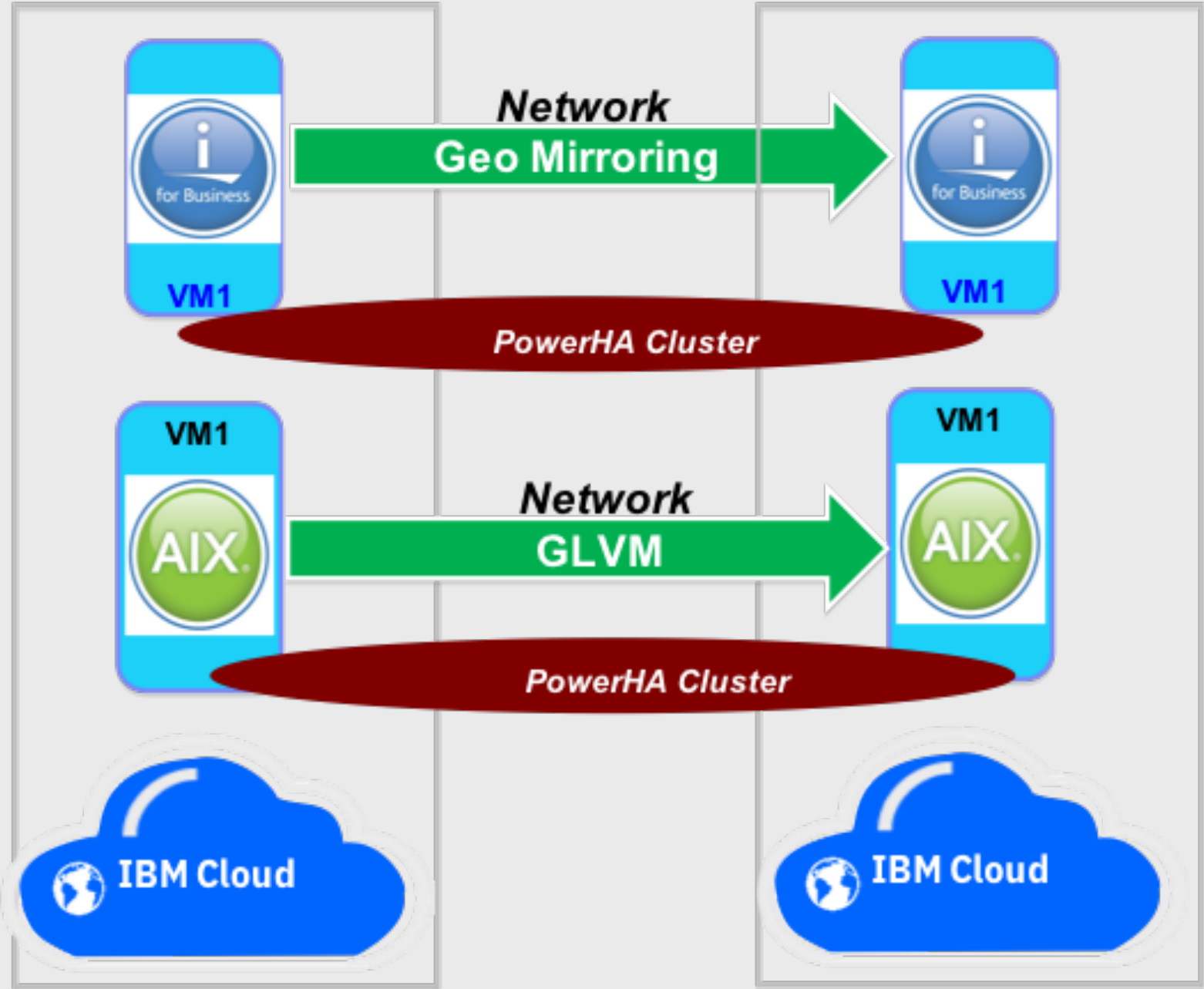
- *IBM I: geomirroring capability allows for OS to OS mirroring across distance*
- *AIX: GLVM allows for OS to OS mirroring across distance*
- Independently or recommended with Power HA EE

**Scenario-2:** Customer can deploy across IBM Cloud regions

PowerHA Enterprise Edition can be used to do DR across Washington and Dallas



Scenario-1: Illustrates Private to Public Cloud: DR solution



Scenario-2: Illustrates Public to Public Cloud DR solution

**Note:** Scenarios assumes use of Power HA Enterprise Edition.

# Disaster Recovery Scenarios (Other Replication Methods)

Customer can implement other replication methods(log replication) as in line with software capabilities(database, applications).

Common options include

– Oracle Data guard

- <https://www.oracle.com/database/technologies/high-availability/dataguard.html>

– DB2 HADR

- <https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/DB2HADR/page/HADR%20Tutorial>

– MiMix

- <https://www-356.ibm.com/partnerworld/gsd/solutiondetails.do?&solution=11871>

– Rocket iCluster

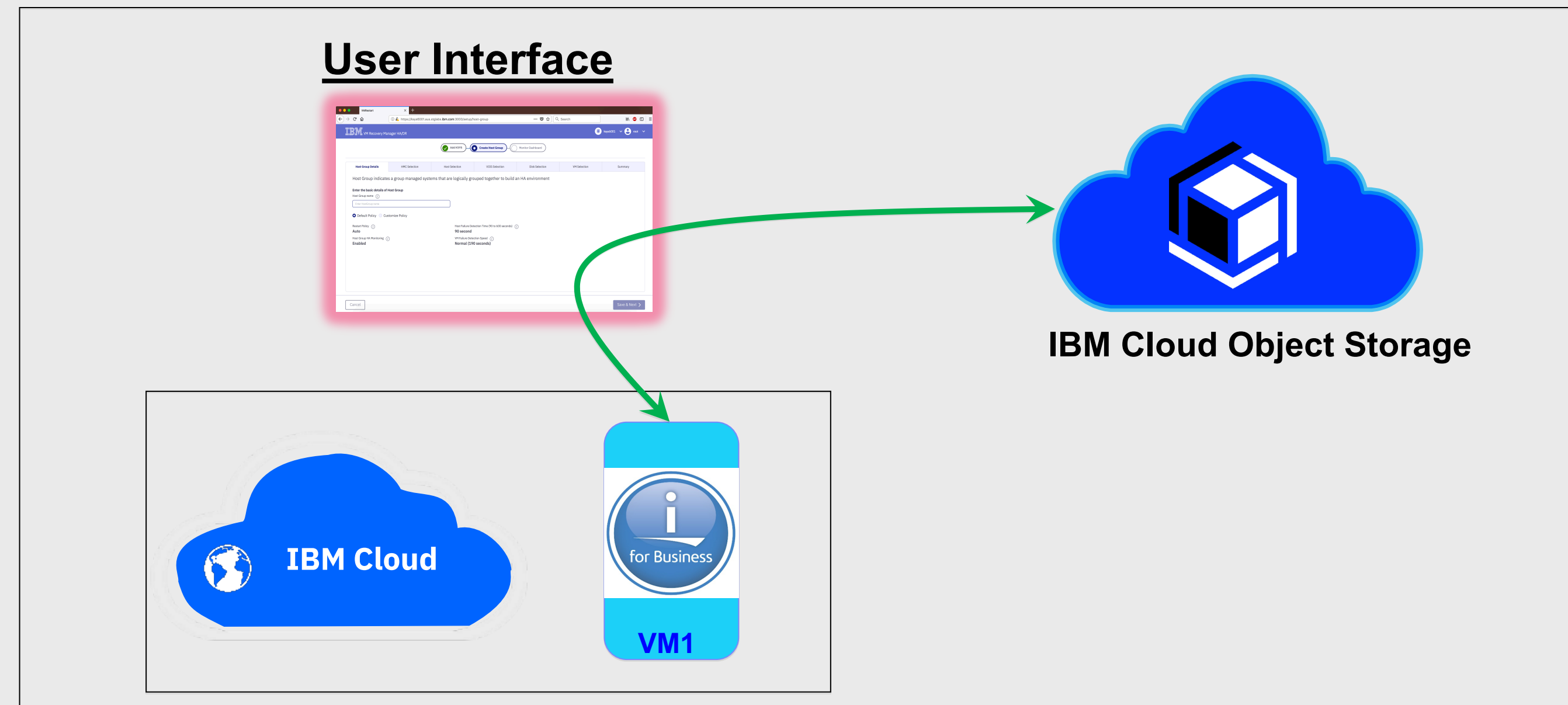
- <https://www.rocketsoftware.com/products/rocket-icluster>

\* Follow best practices as documented by the vendor

# Backup/Restore Scenario for Clients

## Scenario-1: UI based backup/restore

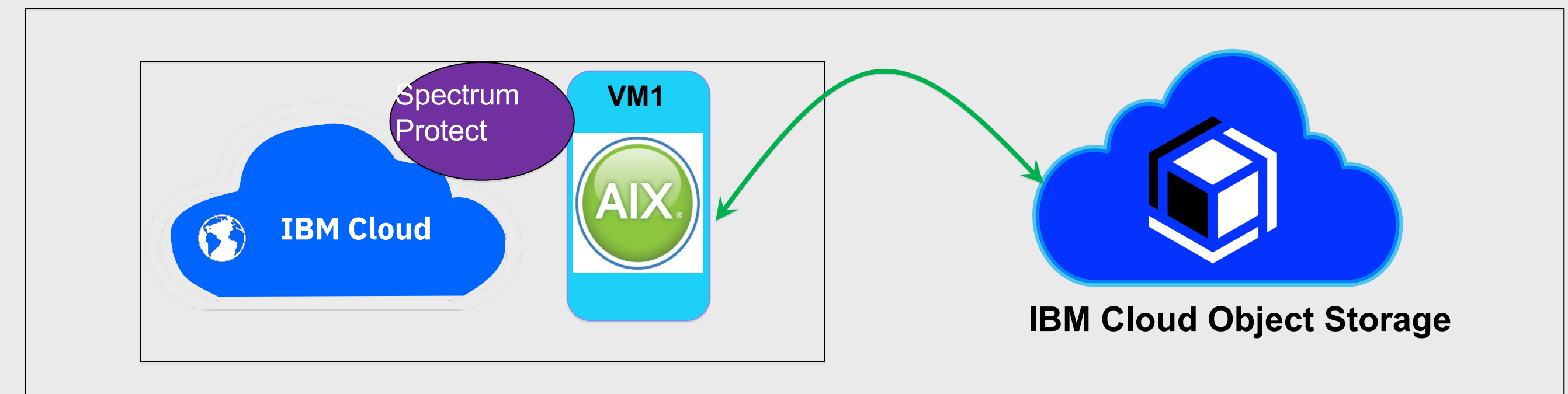
- *Volumes (disks) can be backed up or restored*
- *Entire VM can be backed up*



Scenario-1 Diagram: Backup/Restore Disks or entire VM image

## Scenario-2: Spectrum Protect

- *Object level/File level backup/restore*
- *Fine granular automated policies*



Scenario-2 Diagram: Backup/Restore objects from OS (files, file system etc)

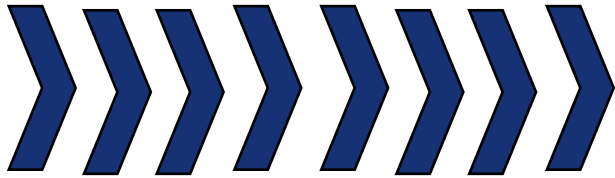
**Note:** Requirements for each Client's Backup and Restore capabilities will vary based on defined architecture. These capabilities require IBM Cloud Object Storage and potentially a VSI that can host management software.

# IBM i Backup in the Cloud

Step 1: Save to the IBM i IMGCLG

**Step 2:** Move the Virtual Tape Images off the IBM i instance

BRMS and Cloud Storage Solutions can help automate this process.



# Sample Migration Techniques

- IBM Cloud Mass Data Migration (MDM)

<https://www.ibm.com/cloud/mass-data-migration/faq>

- IBM Cloud Object Storage (ICOS)

<https://www.ibm.com/cloud/object-storage/faq>

- Data migration with IBM CloudData migration with IBM Cloud

<https://www.ibm.com/cloud/data-migration>

- Host/Database Replication

- Databases/Applications (Oracle data guard/golden gate, etc)

- MIMIX, etc

- Other Third Party Vendors



# A few notes on License Madness

- Oracle – Customer is bringing their own license and insuring compliance, just as they would for on-premises use of their Oracle license.
  - Use dedicated processors to cap processor core usage, aka “hard partitioning”. This is recognized by Oracle.
  - 'lparstat -i' command can be run on a provisioned AIX VM to check that the LPAR mode is "capped" and to indicate the Entitled Core Capacity required for Oracle licensing compliance.
- PowerHA term licenses can be obtained in increments of 3, 6, etc months from e-config.
  - host serial numbers not required

# IBM i Software Included

- Base OS
- 5770-DG1: HTTP Server for i
- 5770-JV1: Developer Kit for Java
- 5770-NAE: Network Authentication Enablement for i
- 5733-SC1: Portable Utilities for i
- 5770-TC1: TCP/IP
- 5770-TS1: Transform Services for i
- 5770-UME: Universal Manageability Enablement for i
- 5770-XE1: IBM i Access for Windows
- Zend
- 5733-ARE: IBM Administration Runtime Expert
- 5798-FAX: IBM Facsimile Support for i
- 5770-SM1: IBM System Manager for i
- 5770-DFH: IBM CICS Transaction Server for i
- 5770-MG1: IBM Managed System Services for i
- 5770-SS1: IBM i Option 23, OptiConnect
- 5770-SS1 : IBM i Option 44, Encrypted Backup Enablement
- 5770-SS1 : IBM i Option 45, Encrypted ASP Enablement
- 5770-SS1 IBM i Option 18 Media & Storage Extensions
- 5770-SS1 IBM i Option 26 DB2 Symmetric Multiprocessing
- 5770-SS1 IBM i Option 27 DB2 Multisystem
- 5770-SS1 IBM i Option 38 PSF for IBM i Any Speed Printer Support
- 5770-SS1 IBM i Option 41 HA Switchable Resources
- 5770-SS1 IBM i Option 42 HA Journal Performance
- 5761-AMT: Rational Application Management Toolset
- 5770-AP1: Advanced DBCS Printer Support
- 5733-B45: AFP Font Collection for i
- 5770-BR1: Backup, Recovery and Media Services
- 5761-DB1: System/38 Utilities
- 5761-CM1: Communications Utilities
- 5761-DS2: Business Graphics Utility
- 5648-E77: InfoPrint Fonts
- 5769-FN1: AFP DBCS Fonts
- 5769-FNT: AFP Fonts
- 5770-JS1: Advanced Job Scheduler for i
- 5770-PT1: Performance Tools
- 5770-QU1: Query for i
- 5770-ST1: DB2 Query Manager and SQL Dev Kit for i
- 5733-XT2: XML Toolkit
- 5770-XW1: IBM i Access Family - unlimited users included



# Lab Services

# Cloud Design Workshop

## Overview

The Cloud Design Workshop examines a client's on-premise cloud or Power in the cloud requirements and creates a blueprint for implementing the most suitable solution.

## Target Audience

- Clients using AIX, IBM i or Linux on Power who want to implement on-premise/private cloud
- Clients who are interested in Power in the cloud
- Clients who are interested in a subscription/pay-as-you-go model for Power
- Clients who are looking for a hybrid/multicloud solution on Power
- Clients who want to deploy automation or self-service on Power

## Benefits

- Clear technical understanding of available on-premise and Power in the cloud solutions and their benefits
- List of target workloads for on-premise and/or Power in the cloud
- List of requirements and next steps for on-premise and/or cloud implementation
- Resulting cloud design is customized for client's environment and based on best practices

## Qualifying Questions

- Do you want a simpler and faster way to provision AIX, IBM i or Linux on premise?
- Are you considering Power in the cloud or a pay-as-you-go model for Power?
- Are looking for automation on Power or integration with VMware?
- Are you looking for a hybrid/multicloud solution on Power?

## Team Contacts

Vess Natchev, [vess@us.ibm.com](mailto:vess@us.ibm.com)

## Key Features

- Identify and document current AIX/IBM i/Linux on Power pain points
- Technical deep-dive on available on-premise and cloud solutions for Power
- Review current server/storage/network environment and provisioning process
- Identify target workloads for on-premise and/or Power in the cloud
- Evaluate existing VMs for overallocation of resources
- Determine readiness for on-premise cloud or Power in the cloud
- Identify requirements and next steps for on-premise and/or cloud implementation
- Define use cases for on-premise cloud and/or Power in the cloud implementation
- Obtain buy-in of key server/storage/network/application stakeholders
- Create Cloud Implementation Blueprint to document discussions and implementation plan

## Deliverables

The Cloud Design Workshop results in a **Cloud Implementation Blueprint** document for later deployment of an on-premise/private cloud or Power in the Cloud. Following the onsite portion of the workshop, the Lab Services consultant creates and reviews the document with the client the same week. The Blueprint then serves as the plan of record (POR) for the follow-on implementation service.

## Duration

The service varies depending on the size and complexity of the implementation, but will be customized to specific client requirements.

## Resources

Learn more about Power cloud solutions at <https://www.ibm.com/it-infrastructure/power>

# Moving Power Workloads to the Cloud

## Overview

This service will assist a client with moving on-premise Power Systems workloads to Power in the cloud based on a plan jointly developed with the client.

## Target Audience

- Clients who are interested in running AIX or IBM i in the cloud
- Clients who are interested in a subscription/pay-as you-go-model for Power
- Clients who are looking for a hybrid/multicloud solution on Power

## Benefits

- Move defined set of on-premise workloads to Power in the cloud
- Use standard AIX/IBM i image templates to deploy new workloads in the cloud
- Create your own AIX/IBM i image templates for deployment in the cloud
- Access cloud workloads from on-premise environment
- Connect Power workloads to other cloud services
- Skills transfer on managing AIX or IBM i in the cloud

## Qualifying Questions

- Are you considering Power in the cloud or a pay-as-you-go model for Power?
- Are looking for the flexibility of a hybrid cloud model for AIX or IBM i?
- Are you struggling to find AIX or IBM i skills for on-premise workload management?

## Team Contacts

Vess Natchev, [vess@us.ibm.com](mailto:vess@us.ibm.com)

## Key Features

- Technical deep-dive on Power in the cloud capabilities
- Determine readiness for Power in the cloud
- Identify target workloads
- Prepare workloads for move to the cloud (via PowerVC images or mkysyb)
- Move workloads to cloud
- Validate existing workload operation in the cloud
- Configure secure connection to cloud workloads from on-premise environment
- Demonstrate deployment of new Power workloads in the cloud
- Create and upload a custom AIX or IBM i image template
- Demonstrate accessing other cloud services from Power cloud workloads
- Provide skills transfer on administration and troubleshooting in the cloud

## Deliverables

After the implementation, the details of the Power cloud solution are documented and provided to the client.

## Duration

The service varies depending on the size and complexity of the implementation, but will be customized to specific client requirements.

## Resources

Learn more about Power cloud solutions at <https://www.ibm.com/it-infrastructure/power>

# Advanced Management of Power in the Cloud

## Overview

This service will assist a client with advanced management of Power workloads in the cloud based on a plan jointly developed with the client.

## Target Audience

- Clients who are running AIX or IBM i in the cloud
- Clients looking to address performance, high availability (HA), backups or security for Power workloads in the cloud
- Clients who are looking for a hybrid/multicloud solution on Power

## Benefits

- Fine-tune performance for cloud workloads
- Configure backups to or from the cloud
- Configure HA between on-premise and cloud workloads
- Leverage other cloud services from Power cloud workloads
- Extend existing on-premise automation to AIX or IBM i in the cloud
- Create a multicloud solution with on-premise and cloud workloads

## Qualifying Questions

- Are you AIX or IBM i in the cloud?
- Are looking to perform cloud backups?
- Are you looking to address performance or HA for your Power cloud workloads?
- Are you looking for a hybrid/multicloud Power solution?

## Team Contacts

Vess Natchev, [vess@us.ibm.com](mailto:vess@us.ibm.com)

## Key Features

- Evaluate and fine-tune performance of Power cloud workloads
- Extend Ansible, Chef or other on-premise automation to AIX or IBM i in the cloud
- Extend VM or container on-premise management to Power in the cloud with IBM Cloud Private (ICP) and Cloud Automation Manager (CAM)
- Configure cloud backups
- Configure access to Watson or other cloud services from Power cloud workloads
- Configure a cloud HA solution
- Configure programmatic/API access to Power in the cloud
- Configure a secure multicloud solution for AIX or IBM i

## Deliverables

After the implementation, the details of the Power cloud solution are documented and provided to the client.

## Duration

The service varies depending on the size and complexity of the implementation, but will be customized to specific client requirements.

## Resources

Learn more about Power cloud solutions at <https://www.ibm.com/it-infrastructure/power>

# AIX / IBM i on IBM Cloud

May 2019 

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**Cognitive Systems**

**Thank you!**