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

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

*Coming in 3Q 2019
# IBM Cloud Roadmap for Power Systems

<table>
<thead>
<tr>
<th>Today</th>
<th>2Q 2019</th>
<th>3Q 2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IBM Cloud Private</strong></td>
<td><strong>IBM Cloud: AIX &amp; IBM i</strong></td>
<td><strong>Next Generation Cloud</strong></td>
<td><strong>Next Generation Cloud 2.0</strong></td>
</tr>
<tr>
<td>Open, supported Linux Kubernetes with containers</td>
<td>Runs the most demanding IBM AIX and IBM i applications with complete equivalence to on-prem with FC-based SAN</td>
<td>Scale Out P9 with GPUs fully integrated into next Gen x86 &amp; POWER: same Virtual Private Cloud (VPC) function for Linux VM, container, storage, and networking</td>
<td>Scale-Up P9 w/ AIX and IBM i</td>
</tr>
<tr>
<td>Integrate and manage existing AIX/IBM i VM apps</td>
<td>Integrated into the IBM Cloud experience for purchasing and managing VM, network and storage</td>
<td>Integrated in IBM kubernetes service (managed)</td>
<td>Fully integrated into Next Gen cloud and storage</td>
</tr>
<tr>
<td>Fully supports all POWER8 and POWER9 servers</td>
<td>Tie into other IBM Cloud resources via direct link</td>
<td>Supports hosted IBM Cloud private &amp; rich app catalog</td>
<td>Same VPC experience for PowerVM, storage and networking</td>
</tr>
<tr>
<td>Modernize existing apps and create new cloud native apps with the fastest DBs in the industry</td>
<td>Infuse AI and cognitive apps with the fastest GPU accelerated servers in industry</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>US Hourly</th>
<th>US Monthly</th>
<th>Metric</th>
<th>Element</th>
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</thead>
<tbody>
<tr>
<td>$0.161</td>
<td>$117.69</td>
<td>per core per month</td>
<td>Scale Out Shared (S922)</td>
</tr>
<tr>
<td>$0.645</td>
<td>$470.74</td>
<td>per core per month</td>
<td>Scale Out Dedicated (S922)</td>
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<tr>
<td>$0.434</td>
<td>$316.85</td>
<td>per core per month</td>
<td>Enterprise Shared (E880)</td>
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<tr>
<td>$1.736</td>
<td>$1,267.38</td>
<td>per core per month</td>
<td>Enterprise Dedicated (E880)</td>
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<td>$0.015</td>
<td>$11.11</td>
<td>per GB per month</td>
<td>Memory (std price)</td>
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<tr>
<td>$0.023</td>
<td>$16.67</td>
<td>per GB per month</td>
<td>Memory (High Use, &gt;64GB/core)</td>
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<tr>
<td>$0.040</td>
<td>$29.00</td>
<td>per core per month</td>
<td>AIX Small</td>
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<tr>
<td>$0.108</td>
<td>$79.00</td>
<td>per core per month</td>
<td>AIX Medium</td>
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<td>$1.370</td>
<td>$1,000.00</td>
<td>per core per month</td>
<td>IBM i OS P10</td>
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<td>$3.014</td>
<td>$2,200.00</td>
<td>per core per month</td>
<td>IBM i OS P30</td>
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<td>per core per month</td>
<td>IBM i LPP P10</td>
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<tr>
<td>$1.205</td>
<td>$880.00</td>
<td>per core per month</td>
<td>IBM i LPP P30</td>
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<tr>
<td>$0.00027</td>
<td>$0.200</td>
<td>per GB per month</td>
<td>Tier 1 Storage (SSD)</td>
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<tr>
<td>$0.00014</td>
<td>$0.100</td>
<td>per GB per month</td>
<td>Tier 3 Storage (HDD)</td>
</tr>
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</table>
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
## Offering Roadmap

### Q2 '19
- **(May) Beta in WDC**
  - US East availability (Washington DC)
  - E880 and S922 LPARS (PowerVM based) w/ IBM storewide v7000 storage (SSD and Disk)

### Q3 '19
- **(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

### Q4 ’19 - 1H2020
- **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
Feeling limited in an infrastructure that can’t quickly and economically scale.

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

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

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.

Modern IT Skillsets

Selling point:

These same customers that have had to accommodate 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
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.
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

- 8 x 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
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

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**

- **DB2 HADR**

- **MiMix**

- **Rocket iCluster**

*Follow best practices as documented by the vendor*
Backup/Restore Scenario for Clients

**Scenario-1: UI based based backup/restore**
- Volumes (disks) can be backed up or restored
- Entire VM can be backed up

**Scenario-2: Spectrum Protect**
- Object level/File level backup/restore
- Fine granular automated policies

*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.

IBM Cloud Object Storage
Sample Migration Techniques

• IBM Cloud Mass Data Migration (MDM)

• IBM Cloud Object Storage (ICOS)
  https://www.ibm.com/cloud/object-storage/faq

• Data 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 you looking for automation on Power or integration with VMware?
- Are you looking for a hybrid/multicloud solution on Power?

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

Team Contacts
Vess Natchev, vess@us.ibm.com
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

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 mksysb)
• 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
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

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
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Thank you!