**Introducing IBM’s Power Private Cloud Rack for Db2 on Red Hat Enterprise Linux**

A computer server and computer

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**By Aslam Nomani, Kostas Rakopoulos, and Bryan Tang**

**1. Introduction**

The IBM Power Private Cloud Rack (PCR) for Db2 on Red Hat Enterprise Linux (RHEL) reference architecture is designed to optimize the total cost of ownership (TCO) while delivering high-performance database capabilities. By combining the robust IBM Power processor technology with Red Hat Enterprise Linux and IBM Db2, it provides a scalable, reliable platform for enterprise data processing.

This new PCR for Db2 on RHEL complements the existing PCR for Db2 on OpenShift Container Platform (OCP) solution, giving customers the flexibility to choose the solution that best fits their infrastructure preferences.

Unlike black-box appliances, this reference architecture provides flexibility while ensuring performance, security, scalability, and high availability. It allows organizations to deploy Db2 in a configuration that maximizes simplicity and minimizes time to value, all while ensuring a fully supported environment where Db2 is optimized for peak performance and availability.

This blog provides a comprehensive overview of the deployment process, from architecture and hardware components to installation procedures and maintenance considerations. Whether you're planning a new deployment or considering an upgrade from previous generations like the IBM Integrated Analytics System (IIAS), this guide will help you understand the key aspects of successfully implementing the PCR for Db2 on RHEL in your environment.

**2. Architecture Overview**

The IBM Power Private Cloud Rack for Db2 on RHEL is built on a foundation of IBM Power compute servers and IBM Flash System storage servers. These components form the fundamental building blocks of the reference architecture, which can be scaled from a single rack to multiple racks based on workload requirements.

At the hardware level, each rack contains compute servers, storage servers, and networking components configured to work together seamlessly. The architecture isolates storage I/O within each rack, meaning no storage I/O occurs across rack boundaries (with exceptions for NFS and IBM Q Replication LUNs that must be shared across all compute servers).

On the software side, the solution runs Red Hat Enterprise Linux and IBM Db2 for Linux, UNIX, and Windows. High availability is managed by Pacemaker, which is installed and managed by Db2. This ensures continuous operation even in the event of software or hardware failures.

The smallest deployment includes three compute servers per rack, with one serving as a standby for high availability. Each compute server hosts multiple Db2 data partitions, with dedicated LUNs on the storage server. These LUNs are mapped to all compute servers, allowing a given Db2 data partition to run on any compute server in the rack.

For multi-rack deployments, Rack 1 plays a special role, hosting the Pacemaker domain with resources for the Network File System (NFS) server. This NFS server hosts the shared instance home directory required by Db2 instances using the Data Partitioning Feature (DPF).

For disaster recovery, the architecture supports Q Replication (Qrep), with resources that can be created in a Pacemaker domain on any rack. This provides high availability for both the Capture and Apply processes, allowing the cluster to function as either a source or target for replication.

A computer screen shot of a computer

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FIGURE 1: IBM Power Private Cloud Rack Base Configuration – Base Rack Small

**3. Hardware Components**

The IBM Power Private Cloud Rack for Db2 on RHEL leverages high-performance hardware components to deliver optimal database performance. Let's examine the key hardware elements:

**Compute:**

The solution uses IBM Power10 S1022 servers, each configured with:

* 32 cores
* 1 TB memory
* 2x 2-port SRIOV 100 Gbps ethernet cards
* 2x 2-port 10/1GbE ethernet cards
* 3x 2-port 32 Gbps fiber channel HBA cards

These powerful servers provide the computational foundation for running demanding database workloads, with sufficient memory and network connectivity to handle enterprise-scale data processing.

**Storage:**

Storage is provided by IBM Flash System (FS) 7300 with 9.6 TB NVMe drives arranged in a RAID6 array. The number of drives scales with the deployment size, with 8 drives per active compute server. Each FS 7300 can hold up to 24 NVMe drives, requiring an additional FS 7300 for every 3 active compute servers.

This high-performance storage system delivers low-latency access to data, critical for database operations. The NVMe technology ensures rapid data transfer rates, while the RAID6 configuration provides data protection and redundancy.

The LUNs on the FS 7300s are created as follows:

|  |  |  |
| --- | --- | --- |
| **Description of LUN** | **LUN Size (GB)** | **Number of LUNs** |
| Operating System Boot & Root | 100 | One per compute server |
| Db2 Tablespace Data & Transaction Logs | 4,096 | One per Db2 data partition |
| Db2 Temporary Tablespace Data | 1,024 | One per Db2 data partition |
| Db2 Transaction Log Archives | 256 | One per Db2 data partition |
| Db2 Backups | 1,600 | One per Db2 data partition |
| Db2 Diagnostic Log Path | 25 | One per Db2 data partition |
| Db2 Shared Home | 100 | One per cluster |
| Qrep Shared State | 100 | One per cluster |

**Switches:**

All switches are deployed in redundant pairs to eliminate single points of failure:

**Management switches:**

* IBM 8831-S52 - IBM Ethernet Switch (48x1Gb + 4x10Gb)

**Fabric switches:**

* IBM 8831-00M – IBM Ethernet Switch (32x 100GbE)

**SAN switches:**

* IBM SAN64B-7 (8960-P64)

This network infrastructure ensures reliable connectivity between all components while providing the bandwidth necessary for high-volume data operations.

**4. Software Stack**

The software stack for the IBM Power Private Cloud Rack for Db2 on RHEL consists of carefully selected components that work together to deliver a robust database platform:

**Red Hat Enterprise Linux (RHEL):**

Serving as the operating system foundation, RHEL provides enterprise-grade stability, security, and performance. The reference architecture has been validated with RHEL 9.6 (as of Q3 2025), ensuring compatibility with the latest features and security updates.

**Db2 for Linux, UNIX, and Windows:**

At the core of the solution is IBM Db2 version 12.1.2 (as of Q3 2025), a powerful relational database management system optimized for analytical workloads. Db2 provides advanced features for data management, query processing, and workload optimization.

**High Availability with Pacemaker:**

High availability is managed through Pacemaker, which is installed and configured by Db2. This ensures automatic failover in case of hardware or software failures, minimizing downtime and maintaining service continuity.

**Network File System (NFS):**

NFS version 4 is used to provide shared storage access across the cluster, particularly for the shared instance home directory required by Db2 DPF instances for storing configuration data and metadata.

**Q Replication (Qrep):**

For disaster recovery and data synchronization, the solution includes Q Replication version 11.4.0, enabling efficient data replication between systems.  The QRep features provide an active-active DR solution that can be customized to the needs of individual customers.  Customers can choose to replicate only subsets of the data they choose.

This integrated software stack is thoroughly tested and validated to ensure compatibility and optimal performance. Regular updates are provided to maintain security and incorporate new features, with the latest validated versions documented and supported by IBM.

**Latest validated versions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Release Date** | **RHEL** | **Db2** | **NFS** | **Qrep** |
| Q3 2025 | 9.6 | 12.1.2 | 4 | 11.4.0 |

**5. Sizing and Scalability**

The IBM Power Private Cloud Rack for Db2 on RHEL is designed with inherent scalability to accommodate evolving workload requirements. The reference architecture offers multiple sizing options, from single rack configurations to multi-rack deployments that can scale to meet enterprise demands.

**Single Rack**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Size** | **Compute Servers** | **Active Compute Servers** | **Storage Servers** | **9.6 TB NVMe Drives** | **Total Capacity (TB)** |
| Base Rack Small (BRS) | 3 | 2 | 1 | 16 | 153.6 |
| Base Rack Medium (BRM) | 5 | 4 | 2 | 32 | 307.2 |
| Base Rack Large (BRL) | 7 | 6 | 2 | 48 | 460.8 |

**Multiple Racks**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Size** | **Racks** | **Compute Servers** | **Active Compute Servers** | **Storage Servers** | **9.6 TB NVMe Drives** | **Total Capacity (TB)** |
| BRL + Expansion Rack Small (ERS) | 2 | 11 | 9 | 3 | 72 | 691.2 |
| BRL + Expansion Rack Medium (ERM) | 2 | 14 | 12 | 4 | 96 | 921.6 |
| BRL + Expansion Rack Large (ERL) | 2 | 17 | 15 | 5 | 120 | 1,152.0 |
| BRL + 2x ERL | 3 | 27 | 24 | 8 | 192 | 1,843.2 |
| BRL + 3x ERL | 4 | 37 | 33 | 11 | 264 | 2,534.4 |
| BRL + 4x ERL | 5 | 47 | 42 | 14 | 336 | 3,225.6 |
| BRL + 5x ERL | 6 | 57 | 51 | 17 | 408 | 3,916.8 |
| BRL + 6x ERL | 7 | 67 | 60 | 20 | 480 | 4,608.0 |
| BRL + 7x ERL | 8 | 77 | 69 | 23 | 552 | 5,299.2 |

**6. Deployment Process**

Deploying the IBM Power Private Cloud Rack for Db2 on RHEL involves careful planning and execution to ensure optimal performance and reliability. IBM provides comprehensive services to guide customers through this process.

**Pre-installation Planning:**

Before deployment, IBM conducts a thorough assessment of requirements and site readiness, including:

* **Site Contacts**: Establishing a team with defined roles (delivery, hardware, power, network, and project management).
* **Site Access:** Evaluating physical access routes, including receiving docks, elevators, doorways, ramps, floor load capacity, and floor protection requirements.
* **Site Infrastructure:** Assessing service space, power requirements, and cooling solutions.
* **Network Connectivity:** Determining network cable requirements, IP addresses, hostnames, domain information, and access to network services (DNS, NTP, SMTP).
* **On-site Access:** Understanding site clearance procedures, security requirements, allowed devices, and hours of operation.

This planning phase is critical to ensure a smooth installation process and minimize potential issues.

**Site Preparation:**

Based on the pre-installation assessment, customers prepare their site according to IBM's guidelines. This includes ensuring adequate power, cooling, network connectivity, and physical space for the rack.

**On-site Installation Execution:**

IBM provides Expert Lab Services for installation and setup in the customer's data center. The installation process includes:

* **Physical Inspection:** Examining the rack frame, doors, wheels, and internal equipment to ensure everything is in working condition.
* **Connecting Power:** Working with data center electricians to connect power to the system safely.
* **Powering on the System**: Activating PDUs, switches, storage, and HMCs in the correct sequence.
* **System Verification**: Performing comprehensive checks of all components to verify hardware health, platform stability, and storage availability.
* **Firmware Updates:** Ensuring all system firmware is at the recommended levels.
* **Client Network**: Configuring network settings & connecting to the client's network infrastructure.
* **System Software Updates**: Updating operating systems to the latest recommended levels.
* **Accessibility:** Providing temporary access credentials and verifying system accessibility.
* **Log Collection**: Capturing system configuration and health information.
* **Welcome Sheet**: Compiling essential system information for the client.

This structured approach to deployment ensures that the system is properly installed, configured, and ready for production use. IBM's Expert Lab Services team manages the entire process, from initial assessment to final handover, providing a "gold-glove experience" for customers.

**7. System Management and Monitoring**

Effective management and monitoring are essential for maintaining optimal performance of the IBM Power Private Cloud Rack for Db2 on RHEL. The reference architecture includes comprehensive tools and interfaces for system administration.

**Management Interfaces:**

The system includes multiple management interfaces:

* **Hardware Management Console (HMC):** Provides centralized management of Power servers, allowing administrators to monitor hardware health, manage firmware, and configure system resources.
* **Db2 Management Console (DMC):** Offers a unified interface for database administration, including performance monitoring, workload management, and resource optimization.
* **Storage Management**: IBM Flash System management interfaces enable storage configuration, monitoring, and troubleshooting.

**Performance Monitoring:**

The solution supports comprehensive performance monitoring capabilities:

* **Real-time Metrics**: Continuous collection and visualization of system metrics, including CPU utilization, memory usage, I/O performance, and network throughput.
* **Historical Analysis**: Tracking performance trends over time to identify patterns and potential issues before they impact operations.
* **Query Performance**: Detailed monitoring of database query execution, allowing administrators to identify and optimize slow-running queries.

**Health Checks and Diagnostics:**

Regular health checks ensure the system operates at peak efficiency:

* **Automated Diagnostics**: Built-in tools that automatically detect and report potential issues.
* **Proactive Monitoring**: Continuous monitoring of system components to identify early warning signs of problems.
* **Log Analysis:** Centralized collection and analysis of system logs to facilitate troubleshooting.

These management and monitoring capabilities enable administrators to maintain optimal system performance, quickly identify and resolve issues, and ensure the solution meets business requirements consistently.

**8. Maintenance and Support**

Maintaining the IBM Power Private Cloud Rack for Db2 on RHEL involves regular updates and proactive management to ensure continued optimal performance and security.

**Firmware and Software Updates:**

The reference architecture includes comprehensive lifecycle management for the entire software and firmware stack:

* **Firmware Updates**: Regular updates to system firmware to address security vulnerabilities and improve functionality.
* **Operating System Updates**: Updates to the operating system and related components.
* **Db2 Software Updates**: Regular updates to the database software to incorporate new features and security patches.

Customers have the flexibility to perform these updates independently or outsource them to IBM or another third party through IBM Expert Lab Services.

**Backup and Recovery Procedures:**

Data protection is a critical aspect of system maintenance:

* **RAID Configurations**: The system uses RAID6 for storage redundancy at the disk level.
* Snapshot Management: Snapshot backup and restore capabilities allow for nearly instantaneous backups and restores.
* **High Availability**: Built-in high availability features enable automatic failover for Db2 upon failure.
* **Disaster Recovery**: Using IBM's Active-Active Q Replication technology for robust disaster recovery capabilities.

**Support Options:**

IBM provides a unified support model for the reference architecture:

* **Single Point of Triage**: A streamlined support process with a single point of contact for all hardware and software components.
* **Expert Support Team**: Support personnel with deep knowledge of the architecture, ensuring efficient root cause analysis and resolution.
* **Proactive Maintenance**: Options for IBM-managed maintenance through Expert Lab Services.

This integrated approach to maintenance and support minimizes downtime, ensures system reliability, and provides peace of mind for organizations deploying the reference architecture.

**9. Conclusion**

The IBM Power Private Cloud Rack for Db2 on Red Hat Enterprise Linux represents a powerful, flexible solution for organizations seeking high-performance database capabilities with optimized total cost of ownership. By following the deployment guidance outlined in this blog, organizations can successfully implement this reference architecture and realize its full potential.

Key takeaways from this deployment guide include:

* The reference architecture combines IBM Power10 servers, Flash System storage, and Db2 software to create a robust platform for enterprise data processing.
* Scalability options range from small single-rack configurations to large multi-rack deployments, accommodating a wide range of workload requirements.
* The deployment process involves careful planning and execution, with IBM providing comprehensive services to ensure successful implementation.
* High availability and disaster recovery capabilities are built into the architecture, ensuring business continuity.

By leveraging this reference architecture, organizations can deploy Db2 in a configuration that maximizes simplicity and minimizes time to value, all while ensuring a fully supported environment where Db2 is optimized for peak performance and availability.

For more information about the IBM Power Private Cloud Rack for Db2 on RHEL, contact your IBM representative or visit the IBM website.

**10. About the Authors**

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