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Accelerating IBM watsonx.data with IBM Fusion HCI

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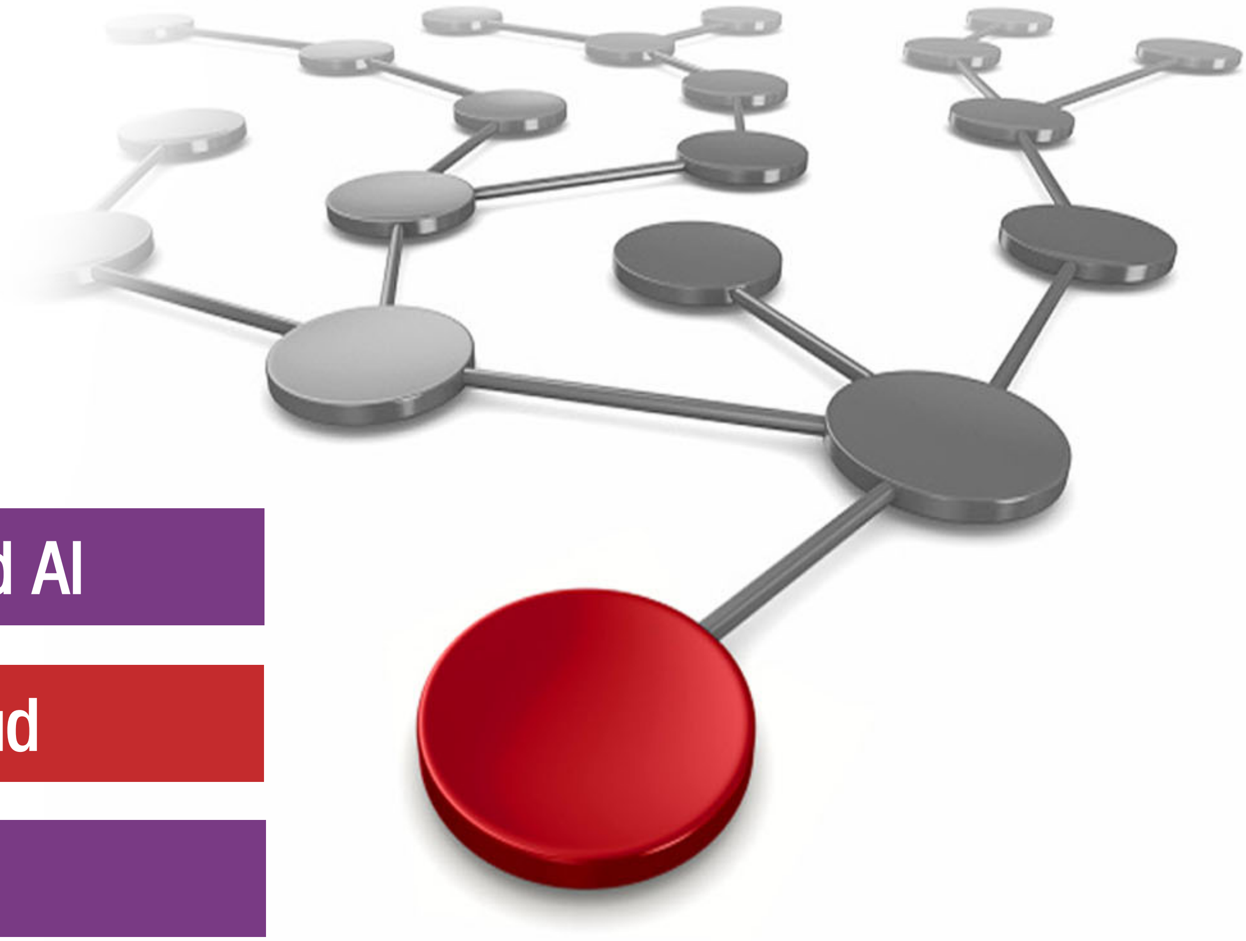

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March 2024

REDP-5720-00

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First Edition (March 2024)

This edition applies to Version 2, Release 7, Modification x of IBM Fusion HCI

Contents

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Preface

Organizations that are expanding from AI pilot projects to full-scale production systems typically need a set of tools for building and deploying foundation models, a container-based application platform, software-defined storage, and hardware on which to run it all. This IBM Redpaper publication describes the IBM® solution for running IBM watsonx.data on premises, with IBM Fusion HCI providing an appliance-based hosting platform, and IBM Storage Ceph providing cloud-scale object storage.

This publication shows how to set up the Storage Acceleration feature, so IBM watsonx.data queries can benefit from a shareable on-premises high-performance cache acceleration. The Storage Acceleration feature is available only on an IBM Fusion HCI.

This paper is targeted toward technical professionals, consultants, technical support staff, IT Architects, and IT specialists who are responsible for delivering data lakehouse solutions optimized for data, analytics, and AI workloads.

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Thanks to the following people for their contributions to this project:

Patrik Hysky
IBM Redbooks®, IBM Infrastructure

Pramod Thekkepat Achutha, Tara Astigarraga, Scott Colbeck, Karli Collins, Marcel Hergaarden, Ted Hoover, Lisa Huston, Kedar Karmarkar, Moushumi Kalita, Joshua Kim, Ana Lilia Sanchez Llamas, Ajay Lunawat, Boda Devi Manikanta, Kevin Shen, Bill Stoddard, Chris Tan, Thiha Than, Garth Tschetter, Hans Uhlig
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Solution overview

Organizations that are expanding from AI pilot projects to full-scale production systems typically need the following components:

- A set of tools for building and deploying foundation models
- A container-based application platform
- Software-defined storage
- Hardware on which to run it

This publication describes the IBM solution for running IBM watsonx.data on premises, with IBM Fusion HCI providing an appliance-based hosting platform, and IBM Storage Ceph providing cloud-scale object storage. This publication shows how to set up the Storage Acceleration feature, which is only available on IBM Fusion HCI, so IBM watsonx.data queries can benefit from a shareable on-premises, high-performance cache acceleration.

This paper is targeted toward technical professionals including consultants, technical support staff, IT Architects, and IT specialists who are responsible for delivering optimized for data, analytics, and AI workloads.

This chapter includes an overview covering the background of data lakes and how the IBM solution of IBM watsonx.data, IBM Storage Ceph, and IBM Fusion HCI accelerated infrastructure works to improve on-premises performance and improves cost efficiency. The architecture of the solution and components are also described.

1.1 Overview

This section describes the evolution of data lakes, the emergence of data lakehouses, and IBM watsonx.data lakehouse, IBM Storage Ceph, and the IBM Fusion HCI accelerated infrastructure solution.

From data warehouse to data lake

During the past 20 years, large organizations have changed the way they aggregate data for analytics and business intelligence (BI) purposes. The original approach was to build a single monolithic database, or data warehouse, and then analyze specific subsets of the data through an extract, transform, load (ETL) process based on queries by using structured query language (SQL).

Data warehouses are often used for repeatable reporting and analysis workloads such as monthly sales reports, tracking of sales per region, and website traffic. But building and maintaining a data warehouse is a costly, time-consuming process, and data warehouses work only with structured data.

Moving data warehouses to the cloud doesn't solve the problem. Sometimes, it makes them even more expensive, and they're still not well suited to machine learning or AI applications.

These limitations led to the concept of the data lake, which is a centralized repository that can store massive volumes of data in its original form so that it's consolidated, integrated, secure, and accessible. Data lakes are designed to accommodate all types of data from many different sources:

- Structured data, such as database tables and Excel sheets
- Semi-structured data, such as herbages and XML files
- Unstructured data, such as images, video, audio, and social media posts

Because data lakes are massively scalable and can handle all types of data, they are ideal for real-time analytics, predictive analytics, and machine learning or AI. They are also typically less costly than data warehouses.

Data lakehouse architecture

The data lakehouse is an emerging architecture that offers the flexibility of a data lake with the performance and structure of a data warehouse. Lakehouse solutions typically provide a high-performance query engine over low-cost object storage along with a metadata governance layer. Data lakehouses are based around open-standard object storage and enable multiple analytics and AI workloads to operate simultaneously on top of the data lake without requiring that the data be duplicated and converted.

A key benefit of data lakehouses is that they address the needs of both traditional data warehouse analysts who curate and publish data for business intelligence and reporting purposes; and of data scientists and engineers who run more complex data analysis and processing workloads.

IBM watsonx.data, shown in Figure 1-1, is built on an open lakehouse architecture, supported by querying, governance, and open data formats for accessing and sharing data.

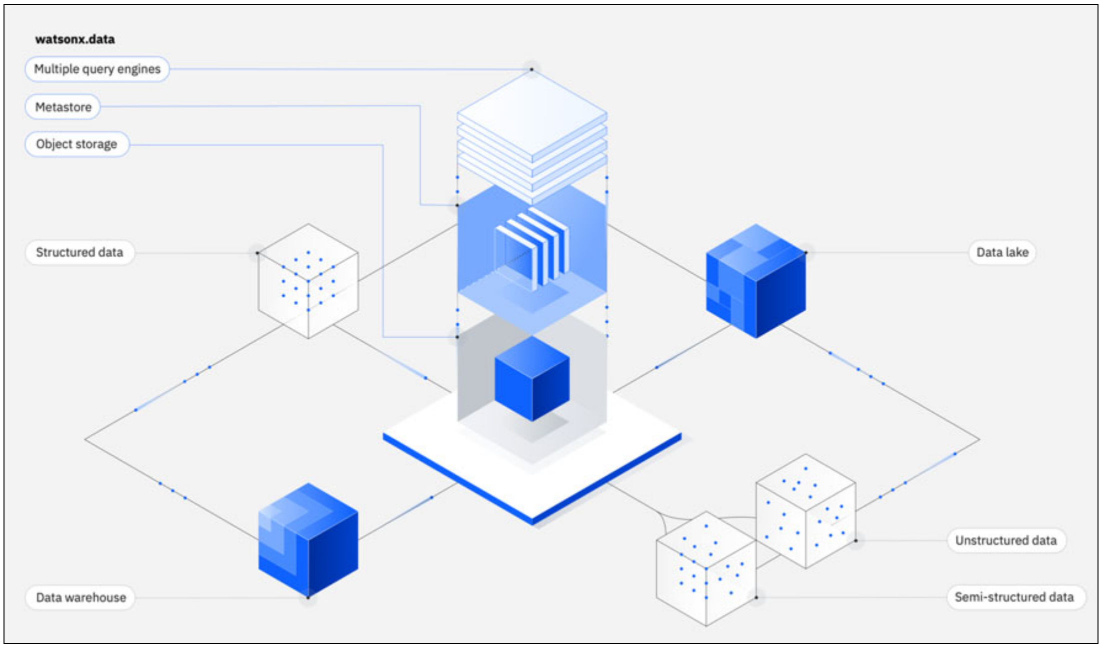

Figure 1-1 IBM watsonx.data provides an ideal platform for building and scaling AI applications

IBM watsonx.data, IBM Storage Ceph, and the IBM Fusion HCI accelerated infrastructure solution

Administrators of today's modern data lakehouses are required to think about storage optimizations as a top priority and a two-tiered approach. The first tier is an on-premises high-performance acceleration layer, which provides superior storage bandwidth with a cost-effective caching approach for the hybrid cloud object storage. The second tier is the low-cost persistent storage for your on-premises storage needs. With the combination of IBM Fusion HCI as your first tier solution and IBM Storage Ceph as your second tier solution, an organization can improve query performance with Storage Acceleration, significant cost advantage, and superior data management capabilities. IBM watsonx.data can take advantage of both of these tiers when using the IBM Fusion HCI and IBM Storage Ceph.