Db2: What's new and What's next

Mike Springgay

IBM, Db2 Chief Architect

IBM
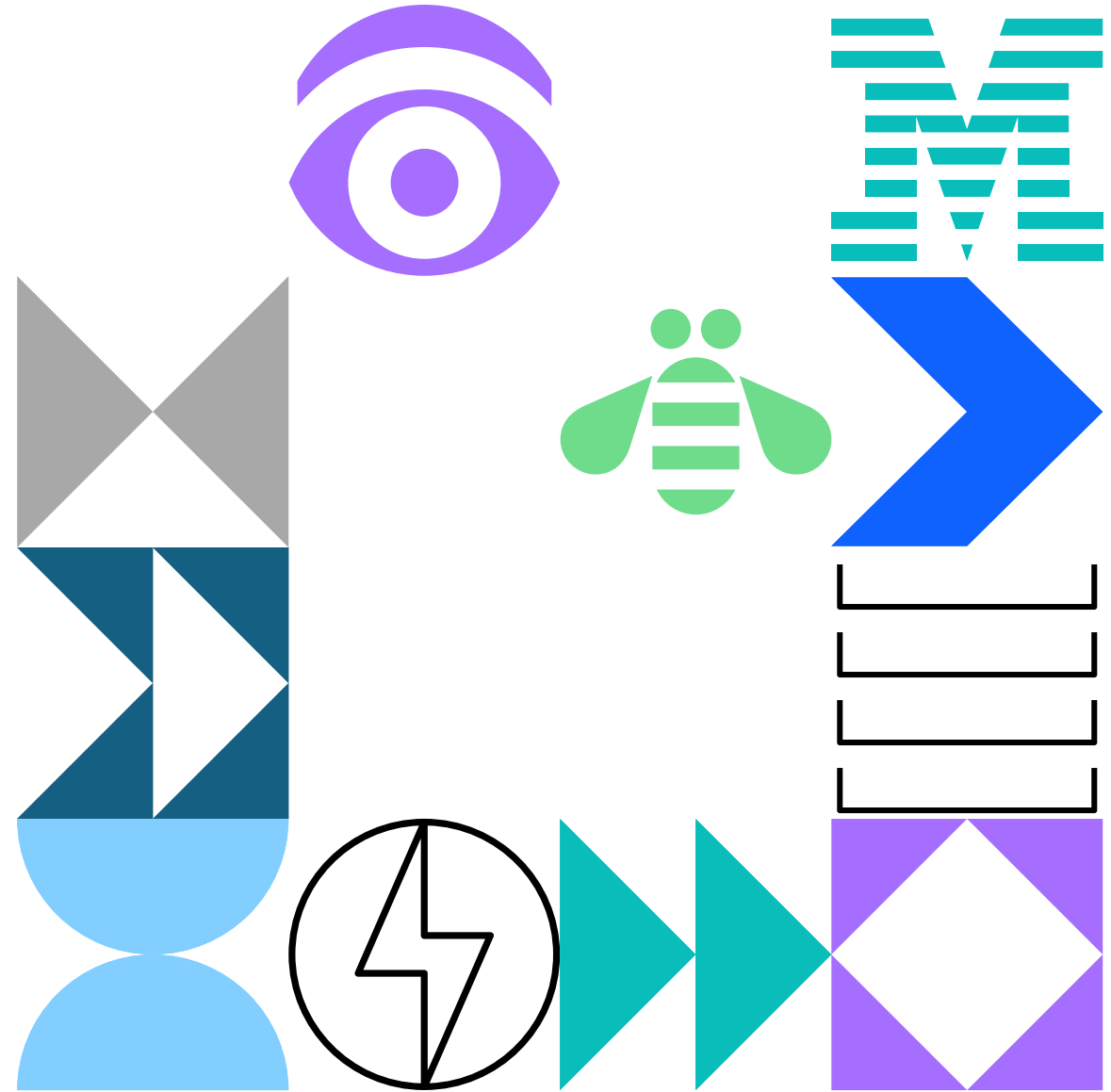
Notices and disclaimers

IBM Db2:
30+ years of innovation

1970s

SQL invented by Edgar F. Codd at IBM

1983

Db2 for Z/OS is born (40+ years ago)

1993

Db2 LUW is born (30+ years ago)

Db2/2 V1	Db2/6000 V1	Db2 PE	Db2 2.1	Db2 5-6	Db2 7-8
1993	1994	1994	1995-1996	1997-1999	2001-2004

Db2 9-9.8	Db2 10.1	Db2 10.5	Db2 11.1	Db2 11.5	Db2 11.5.4
2006–2010	2012	2013	2016	2019	2020

Db2 11.5.5	Db2 11.5.6	Db2 11.5.7	Db2 11.5.8	Db2 11.5.9	Db2 12.1.0
2020	2021	2021	2022	2023	2024

- HADR
- .NET, JDBS, SQLJ, OLE drivers
- VARXXX, XLOBs
- OS/2, AIX, Windows, Linux, Solaris, HPUX
- Text Analytics
- Shared-Nothing Scale-out for OLAP (DPF)
- Granular backups
- Spatial Analytics
- Sequences
- Query Patroller (WLM)
- Db2 Connect
- Data Links
- Data Joiner (Federation)
- Connection pooling
- LDAP integration
- Unicode
- AST/MQT
- Mobile Satellite
- Triggers
- Appliances
- Shared-disk, scale-out for OLTP (pureScale)
- PHP, Perl, Python, RoR, ADO, PL/SQL
- Label-based access control
- Row/column access control
- Roles
- Range partitioning
- pureXML (NoSQL)
- Autonomics
- Multi-tiered storage
- Native encryption
- Audit
- Trusted context
- Multi-dimensional clustering (MDC)
- JSON/BSON support
- Oracle application compatibility
- Compression (tables, index, temp tables)
- Continual data ingestion
- Native OLAP functions
- Native WLM
- Online utilities
- Columnar (BLU)
- Temporal tables
- PostgreSQL compatibility (for NZ workloads)
- Db2 on Cloud (DBaaS)
- External tables
- Event processing
- ML optimizer
- In-database ML
- Advanced log space management
- Graph
- Data virtualization
- Red Hat OpenShift support
- Schema-level security
- Schema-level recovery
- Adaptive Workload Management
- REST APIs
- Namespace Separation (tenancy)

Db2 Four Big Bets for 2024

Db2 on Cloud Hyperscalers

AWS RDS for Db2 licensing and feature enhancements

Db2 on Cloud Next Gen in IBM Cloud

pureScale IaaS in AWS and Azure

Db2 Warehouse Gen3 on IBM Cloud

Fully managed cloud data warehouse featuring Db2 tables on Cloud Object Storage, support for open data formats and watsonx integration

Matches AWS offering

Db2 infused with Generative AI

We're adding Gen AI capabilities into Db2.

Db2 12.1

Full software release targeting all platforms and deployment options

Major release providing new base and jumping off point for continues mod pack deliveries throughout 2025

IBM Db2 + Amazon Web Services

Partnering closely with Amazon to bring our Db2 offerings to AWS

Other offerings available, including:

- **Db2 RDS for OLTP workloads (managed service)**
- **Db2 Warehouse on Cloud (managed service)**
- **Db2 pureScale on AWS**
- **Db2 Container reference architecture**

IBM Signs Strategic Collaboration Agreement with Amazon Web Services to Deliver IBM Software as-a-Service on AWS

- Building on IBM Software being available as-a-Service on IBM Cloud, this first-of-its-kind agreement between IBM and AWS will provide clients with access to IBM Software that runs cloud-native on AWS

May 11, 2022

ARMONK, N.Y., May 11, 2022 /PRNewswire/ -- IBM (NYSE: IBM) today announced that it has signed a Strategic Collaboration Agreement (SCA) with Amazon Web Services, Inc. (AWS), with plans to offer a broad array of its software catalog as Software-as-a-Service (SaaS) on AWS.

Building on IBM Software being available as-a-Service (aaS) on IBM Cloud, this first-of-its-kind agreement between IBM and AWS will provide clients with quick and easy access to IBM Software that spans automation, data and AI, security and sustainability capabilities, is built on Red Hat OpenShift Service on AWS (ROSA), and runs cloud-native on AWS. The two companies are also committing to a broad range of joint investments to make it easier for clients to consume IBM Software on AWS, including integrated go-to-market activities across sales and marketing, channel incentives, developer enablement and training, and solution development for key verticals and industries such as Oil and Gas, Travel and Transportation, and others.

Today, organizations are looking for industry leading services and solutions that allow them to be nimble, flexible, and continuously scalable. This need has been further compounded as demand grows to run software both on-premises and across hybrid cloud environments so they can be scaled globally with high availability.

Moving forward, organizations will be able to run a broad array of the IBM Software catalog as cloud-native services on AWS so they can get up and running quickly to deliver business value. This includes IBM API Connect, IBM Db2, IBM Observability by Instana APM, IBM Maximo Application Suite, IBM Security ReaQta, IBM Security Trusteer, IBM Security Verify, and IBM Watson Orchestrate, with others to follow later this year.

Clients will be able to procure the IBM SaaS products in AWS Marketplace, and then set up and integrate with AWS services, allowing them to get started with just a few clicks, without deploying, updating or managing any of the infrastructure. IBM SaaS products on AWS are designed to provide high availability and elastic scaling on demand to meet unpredictable throughput needs and will offer a native AWS experience with deep integration of AWS services out of the box and support for API, CloudFormation and Terraform templates to enable automation of end-to-end workflows.

For example, using IBM Maximo Application Suite as-a-Service, a manufacturer will be able to take a flexible, demand-based approach to AI-driven asset management to help them monitor and maintain equipment more efficiently, or predict potential mechanical failures to fix them before they create interruptions. By taking advantage of a scalable consumption model for these applications, they can free up capital for innovation, prototyping, tooling and production – and easily expand their usage over time based on evolving market trends and production demands.

More Articles

IBM Federal Ecosystem Supports Executive Order Implementation

IBM Updates Benefits Program for IBMers and Retirees

IBM Announced as COP27 Technology Partner

Subscribe to email

Additional Assets

Db2 Four big bets for 2025

Db2 and Db2 Warehouse SaaS

Roadmap evolution including new Enhancements to IBM Cloud and AWS offerings

Available on additional Hyper Scalers in 2025

Db2 infused with Generative AI

We're adding Gen AI capabilities into Db2. Stay tuned.

UX overhaul for management console

Continued investment to improve the user experience for devs and DBAs

Db2

Multiple 12.1.x mod packs planned for 2025

Introducing the AI-powered Database Assistant

Available now via Db2 & Db2 Warehouse SaaS, the new Database Assistant is designed to help you quickly resolve database issues, manage a growing set of databases, and bring new DBAs up to speed faster than ever before.

Db2 Expert
Get answers to your Db2 questions, faster

What is the default page size in Db2?
What is the purpose of buffer pools?
How do I create a range-partitioned table in Db2 11.5?

Monitoring Metrics
Quickly access key Db2 metrics using natural language queries

Provide me the current list of connections
Retrieve CPU usage from September 9th, 2024
Show me storage utilization by tablespace

Simplified Troubleshooting
Get recommendations for troubleshooting common Db2 issues

What is sqlcode=-964?
"TABLE1.COL1" is not valid in the context where it is used.. SQLCODE=-206, SQLSTATE=42703, DRIVER=4.32.28

Advanced Analysis (coming)
Identify root cause of performance issues, bottlenecks, deadlocks

IBM Db2 / © 2023 IBM Corporation
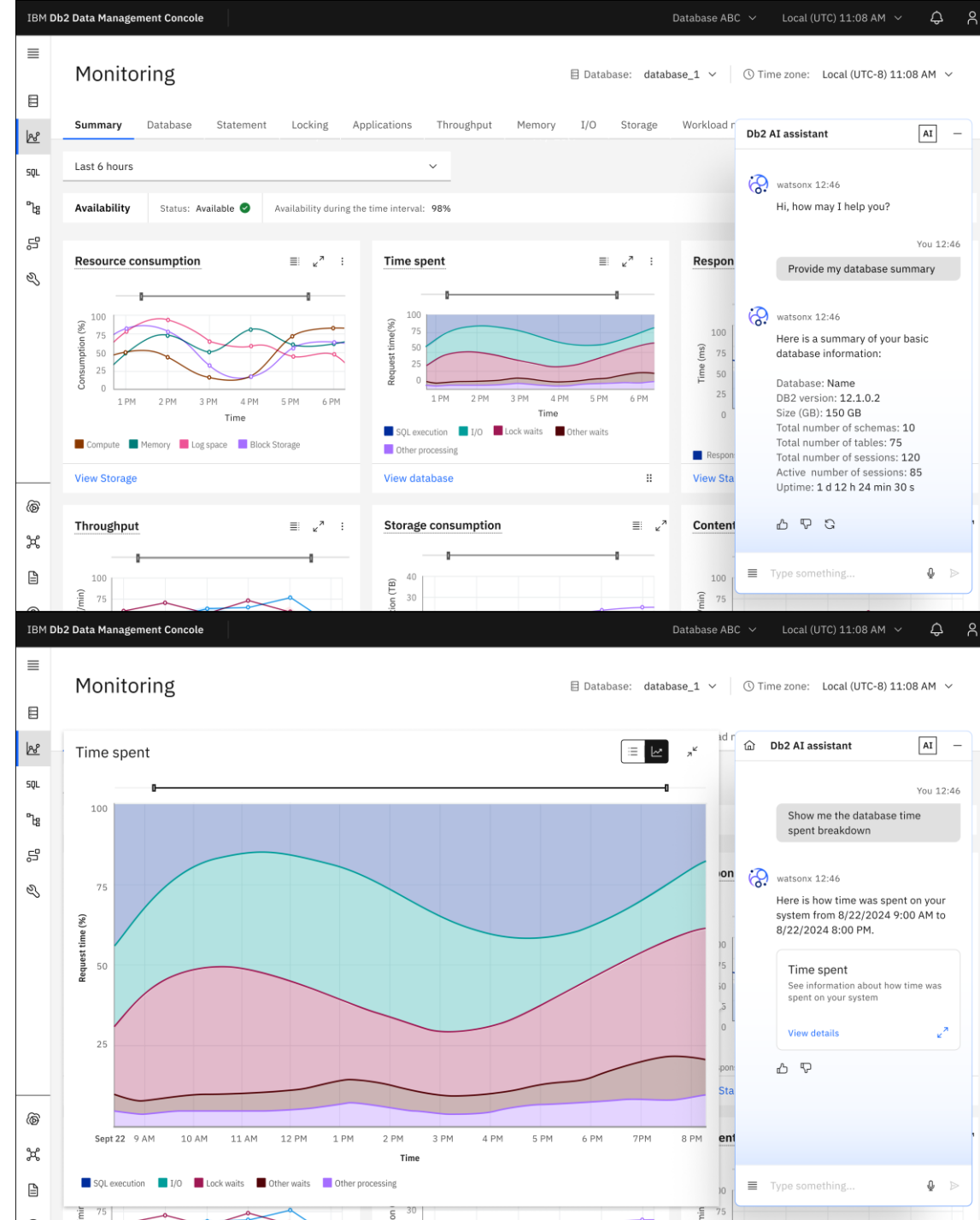
Next major release of the Db2 Database Management Console

In 2025, we plan to launch a brand new Db2 management console:

–**New** Entry Hub
–**New** Monitoring Hub
–**New** Data Workbench
–**New** Administrator Hub
–**New** Conversational Database
  Assistant

and much more!

One Data Movement tool for all your mission critical workloads.

"What"

Move any workloads with Db2 being the target

- ➢ IBM Db2 (source/target)
- ➢ IBM Db2 Warehouse (source/target)
- ➢ IBM Integrated Analytics System (source)
- ➢ Power 10 Cloud Rack (target)
- ➢ Db2 Data files (source/target)
- ➢ Oracle (source)
- ➢ Teradata (source)

"When" : Planned for Q1 2025

"Where"

Support all possible deployment options for Db2

- ➢ On-prem to On-Prem
- ➢ On-prem to Cloud
- ➢ Cloud to On-Prem
- ➢ Cloud to Cloud

"How"

Extensive set of features to accommodate complexities of data movement

- ➢ Schema-level selection of objects
- ➢ Move massive number of databases or large databases with hundreds of Terabytes or Petabytes of data
- ➢ Enable High Performance Unload for faster migrations
- ➢ Support:
  - • Row/Columnar organization
  - • Little/Big Endian formats
  - • All object types, Security labels Privileges, Authorizations

Db2 Warehouse Offerings

Migration Paths for Existing PDOA/IIAS (Sailfish) Appliances

IBM Integrated Analytics System (IIAS)

IBM PureData System for Operational Analytics (PDOA)
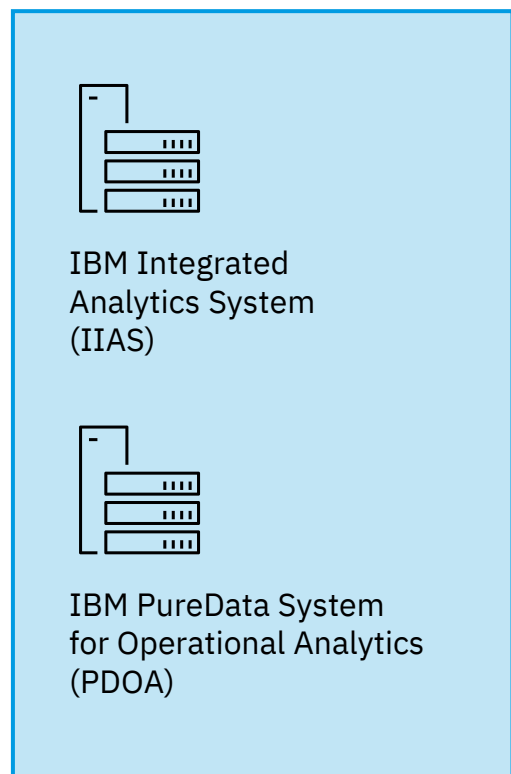
Migrate to...

1. Db2 Warehouse SaaS
Fully managed, high performance, cloud-elastic data warehouse
↳ Runs on both AWS and IBM Cloud
↳ Available in US, EU, UK, JP, AP commercial regions

2. Db2 Warehouse Self-managed
Self-managed data warehouse **on cloud provider** managed Kubernetes or OpenShift infrastructure.
↳ Runs on Amazon EKS, Amazon ROSA, Azure AKS, Azure ARO
↳ Available worldwide
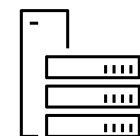
3. Db2 Warehouse Cloud Rack
Self-managed, high performance data warehouse deployable on **on-premises** OpenShift on Power 10 infrastructure
↳ Runs on *POWER10* next-gen on-prem offerings

IBM Db2 Warehouse on Power 10 Cloud Rack

Complete Data Warehouse Solution

Simplify and accelerate your data warehouse deployment in days with our Power 10 Based pre-configured solution that includes everything you need to securely analyze your Data on your premises – including Servers, Storage, Switches, and Services!

Simple

Ease into a Db2 Warehouse with a pre-configured, all-in-one design that removes the guesswork
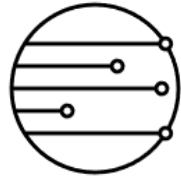
Blazing Fast

Columnar-organized, memory-optimized data warehouse
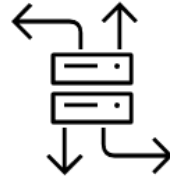
Scalable & Flexible

Build the data warehouse needed for today and easily scale and adapt as your future needs change
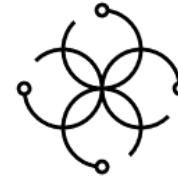
Open for Integration

Support for open formats and integration with watsonx.data

Durable & Reliable

Industry-leading continuous availability and disaster recovery

Db2 Universal Container
Modernize your Db2 workloads anywhere !

11.5
12.1

IBM Db2

Db2 Warehouse

Query Optimizer

watsonx.data

11.5
12.1

presto

ICEBERG

Platforms

Cloud Pak for Data

RHOS Container Platform

Native Kubernetes

AWS EKS/ROSA

Azure AKS/ARO

IBM Cloud

IBM Power
Infrastructure (P10 CR)
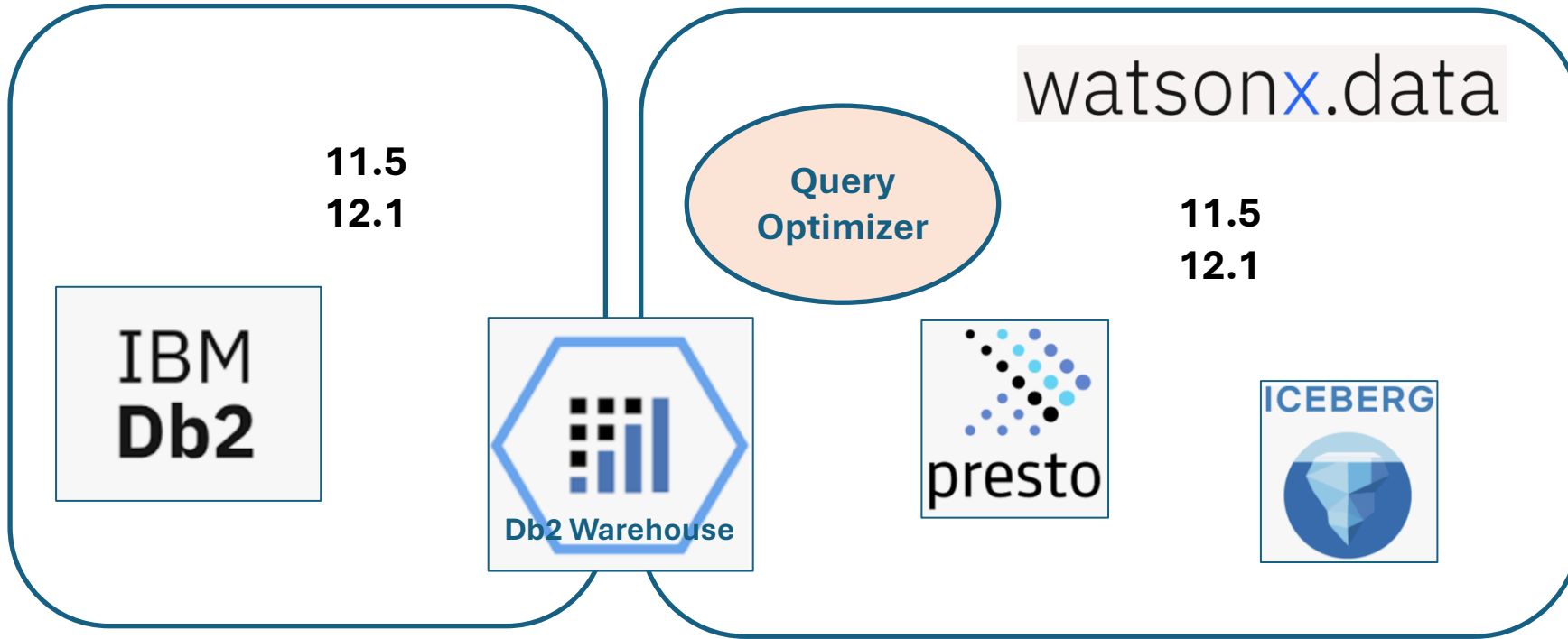
Db2U is the modernization delivery vehicle for:

- Db2 and Db2 Warehouse on Cp4D/Open Shift/K8s
- Db2 Warehouse on Cloud Gen 3 (AWS) and IBM Cloud (VPC Gen 2)
- Hyper-scalers (AWS, Azure and IBM Cloud)
- Next-gen Open Architecture for Appliance Modernization (IBM P10 Cloud Rack)

- Integrating with watsonx.data ecosystem including Lakehouse (DATALAKE table) support
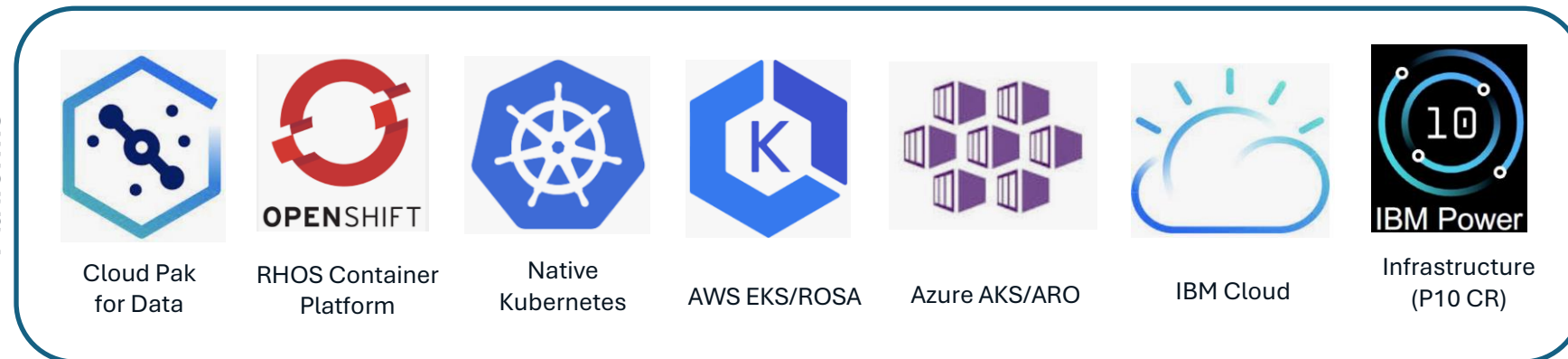
Db2 12.1

Db2 12 brings significant enhancements to Db2 pureScale, name space separation, generative AI-powered insights, a new AI optimizer and hundreds of other enhancements.

Db2 pureScale and HA integration improvements

Complete replacement of TSA with Pacemaker technology for cluster management in Linux, leading to significantly faster failure recovery times and better user experience

AI–powered query optimizer

Allows Db2 to continuously learn from customer's queries and achieve up to 3x query performance improvement over prior version

Name space separation with TENANT construct

Create a logical separation between one or more database schemas, easily isolating differing sets of tables from each other

Db2 infused with Generative AI

We're adding Gen AI capabilities to Db2. DB Assistant and more coming in 2025.

– **Improvements to backup performance by initiating multiple threads to process a single table space**

– **Mac M1/M2 driver support** for developers on macOS using Apple Silicon chip

– **HADR upgrade leverages RoS for enhanced availability**

– **Db2 pureScale HADR support for enterprise-grade end-to-end SSL** encryption

– **Online index reorg for Db2 pureScale** allowing index reorg while table remains online/available (mod 1)

– **ADMIN_MOVE_TABLE** performance and availability enhancements

– **Security enhancements** with AUDIT exceptions, Trusted Context and data masking

– Continuing investment in **cloud object storage performance**

– **Schema evolution with DROP and RENAME** support for online schema updates to columnar tables

– **UPDATE and JOIN** performance enhancements for columnar tables

– **Logical backup/restore** experience improvements

– **Federation enhancements** with support for Snowflake, Oracle 23c and performance improvements

IBM

Db2 12.1 Supported OS and Platform

Distro	Version	Db2 Server	Db2 Client/DSDRIVER	HA	pureScale
RHEL	9.4	x86-64 System z Power 9,10 LE	x86-64, x86-32 System z (64bit only) Power 9,10 LE (64bit only)	x86-64 System z Power 9,10 LE (Pacemaker)	x86-64 ⭐ System z Power 9,10 LE (Pacemaker)
SUSE	15SP6	x86-64 System z Power 9,10 LE	x86-64, x86-32 System z Power 9,10 LE	x86-64 System z Power 9,10 LE (Pacemaker)	x86-64 ⭐ (Pacemaker)
Ubuntu	22.04 LTS	x86-64 System z Power 9,10 LE	x86-64, x86-32 System z Power 9,10 LE	N/A	N/A
AIX	7.3TL2	64bit Power 9,10 LE	64bit Power 9,10 LE	64bit Power 9,10 LE (TSA)	64bit ⭐ Power 9,10 LE (TSA)
Windows Desktop	11	x86-64	X86-64, x86-32	N/A	N/A
Windows Server	2022	x86-64	X86-64, x86-32	N/A	N/A
Mac	Sonoma ⭐ M1/M2/M3 Arm chip	N/Z	64bit DSDRIVER only	N/A	N/A
UBI Open shift	9 ⭐	x86-64 System z Power LE	N/A	x86-64 System z Power LE	N/A

SLES pureScale delayed to 12.1.1 due to dependency delays

Pacemaker Integration with Db2

ADVANTAGES

- 18+ years in industry as HA resource cluster manager
- Included by RHEL and SuSE as paid add-on HA package
- Open source: inspect, collaborate and innovate
- Align with IBM Open-Source Strategy

BENEFITS

Cloud Ready

Faster Failover Recovery

Lower $$$ ~~Cluster Software~~

First contribution to community in V11.5.6.0 !!!!
STACK MODERNIZATION open source

One Team *Just Db2* Technical Support

Simpler *Architecture* *Simplified PD*

2Q 2020	4Q 2020	2Q 2021	4Q 2021	4Q 2022	2024 and beyond

MAJOR RELEASE

V11.5.4.0
- **Automated HA**
  - TSA
  - Pacemaker Technical Preview: 2-node HADR on Linux
- **pureScale**
  - TSA

V11.5.5.0
- **Automated HA**
  - TSA
  - Pacemaker GA: 2-node HADR on Linux
- **pureScale**
  - TSA

V11.5.6.0
- **Automated HA**
  - TSA
  - Pacemaker (More enhancements on Linux)
- **pureScale**
  - TSA

V11.5.7.0
- **Automated HA**
  - TSA
  - Pacemaker (expand to PPCLE)
- **pureScale**
  - TSA

V11.5.8.0 & V11.5.9.0
- **Automated HA**
  - TSA
  - Pacemaker with Mutual Failover HA on Linux
- **pureScale**
  - TSA

V12.1.0
- **Automated HA**
  - **TSA only on AIX**
  - **Pacemaker only on Linux, including DPF HA**
- **pureScale**
  - **TSA only on AIX**
  - **Pacemaker only on Linux**

Future Considerations
- **Automated HA and pureScale**
  - RDMA and Fast Fencing support for pureScale on Cloud
  - Online drop member

TSA will continue to be bundled with Db2 install image → on AIX only

Automated install & config. of Pacemaker →

Automated install and configuration →

Note: Roadmap subjected to change

Pacemaker Integration with Db2

Single DB Partition (EE)
with automated HADR

Primary   Standby
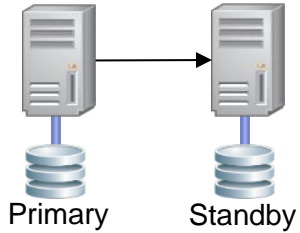
Mutual Failover (a.k.a. Active/Passive)
with automated HA with shared storage

Active   Passive
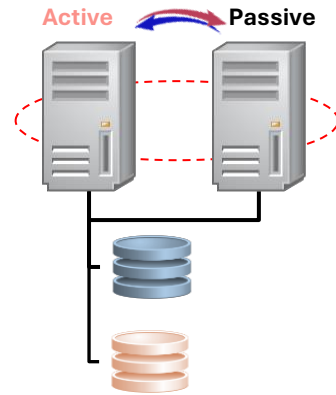
Database Partitioning Feature (DPF)
with automated HA (same site)

Standby
Host
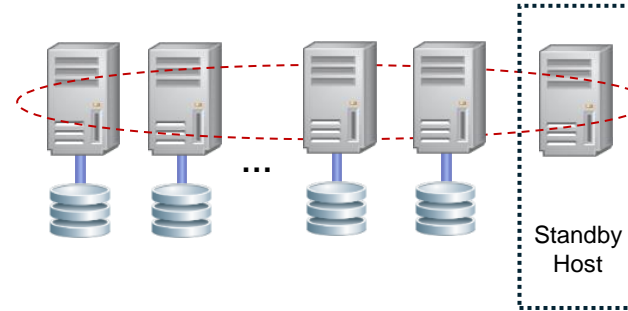
pureScale
Online 24x7x365 with
automatic failover

...

Current

| db2haicu | non-pureScale HA with TSA |
| db2cluster | pureScale with TSA + Spectrum Scale |

New Unified Utility

| db2cm | non-pureScale & pureScale |
| | Pacemaker + Spectrum Scale |

➤ db2cm ➤

➤ -create ─┬─ -cluster ── ➤ **Domain**

-instance ── *instance-name* ── -host ── *host-name*

-publicEthernet ── *public-Ethernet-device-name* ── -host ── *host-name*

-db ── *database-name* ── -instance ── *local-instance-name*

-primaryVIP ── *ipv4-address* ─┬──────────────── -db ── *database-name* ── -instance ── *local-instance-name*
                               └─ -netmask ── *subnet-mask* ─┘

-standbyVIP ── *ipv4-address* ─┬──────────────── -db ── *database-name* ── -instance ── *local-instance-name*
                               └─ -netmask ── *subnet-mask* ─┘

Instance, HADR DB, Ethernet Resources

-qdevice ── *quorum-device-host-name*

Quorum

Db2 Namespace Separation (1|2)

- ## What is Namespace Separation (Tenant)?
  - A single physical database supporting multiple "Tenants"
  - All tenants share the same infrastructure and resources
  - Each tenant has a private, isolated perspective for their own objects
- ## What problem does having Tenants solve?
  - ✓ Netezza/PostgreSQL compatibility
  - ✓ Cost-savings through consolidation
  - ✓ Reduction of fixed overhead costs associated with individual databases
  - ✓ Centralization/simplification of database operations
  - ✓ Sharing unique environments without collisions
  - ✓ Significant cost-savings for our customers with many small development systems
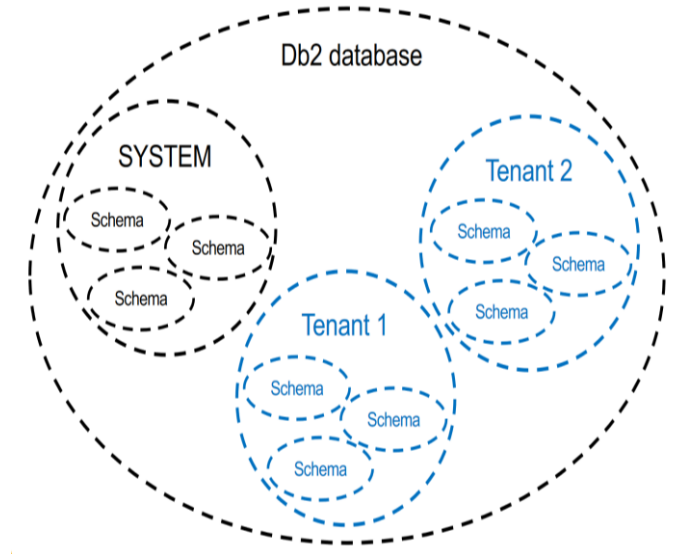
Db2 Namespace Separation (2|2)

- The default SYSTEM tenant
  - The initial set of catalogs established when the database is created
  - This is referred to as the SYSTEM tenant
  - Cannot be removed
  - Contains catalog information for shared resources and Db2 defined objects

- User-defined tenants
  - A DBADM can create a tenant to set up an independent catalog namespace within a Db2 database using CREATE TENANT statement
- All connections made to a database are initially associated with the SYSTEM tenant
  - A SET TENANT statement must be issued to associate a connection with a user-defined tenant
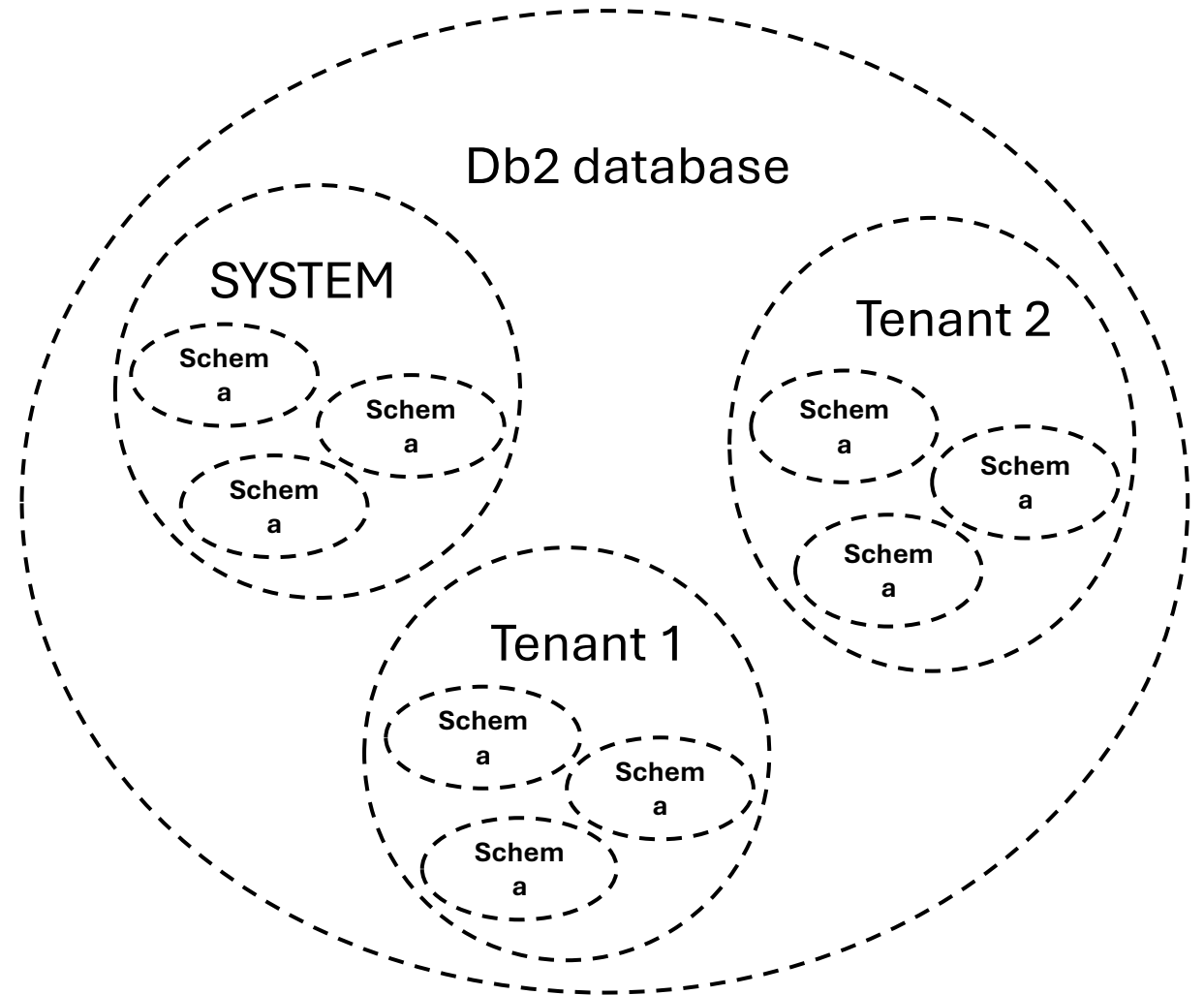
AI-powered query optimizer

Db2 12.1 integrates advanced AI optimizer capabilities, allowing businesses to harness the power of AI directly within their database their operations. This elevates query performance through automated performance tuning, predictive analytics, and intelligent query optimization.

AI allows Db2 to continuously learn from client queries, automate SQL tuning with AI, and optimize performance 3X faster.

Cardinality estimation for a subset of local predicates using a learned model
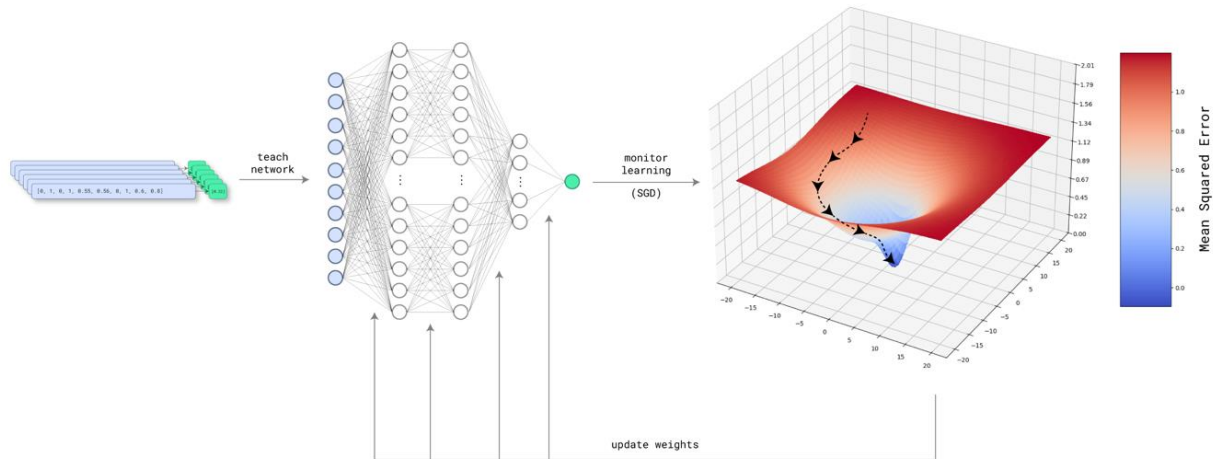
Model policies to filter which tables can have models discovered on them

Explain support to show model information in the execution plan

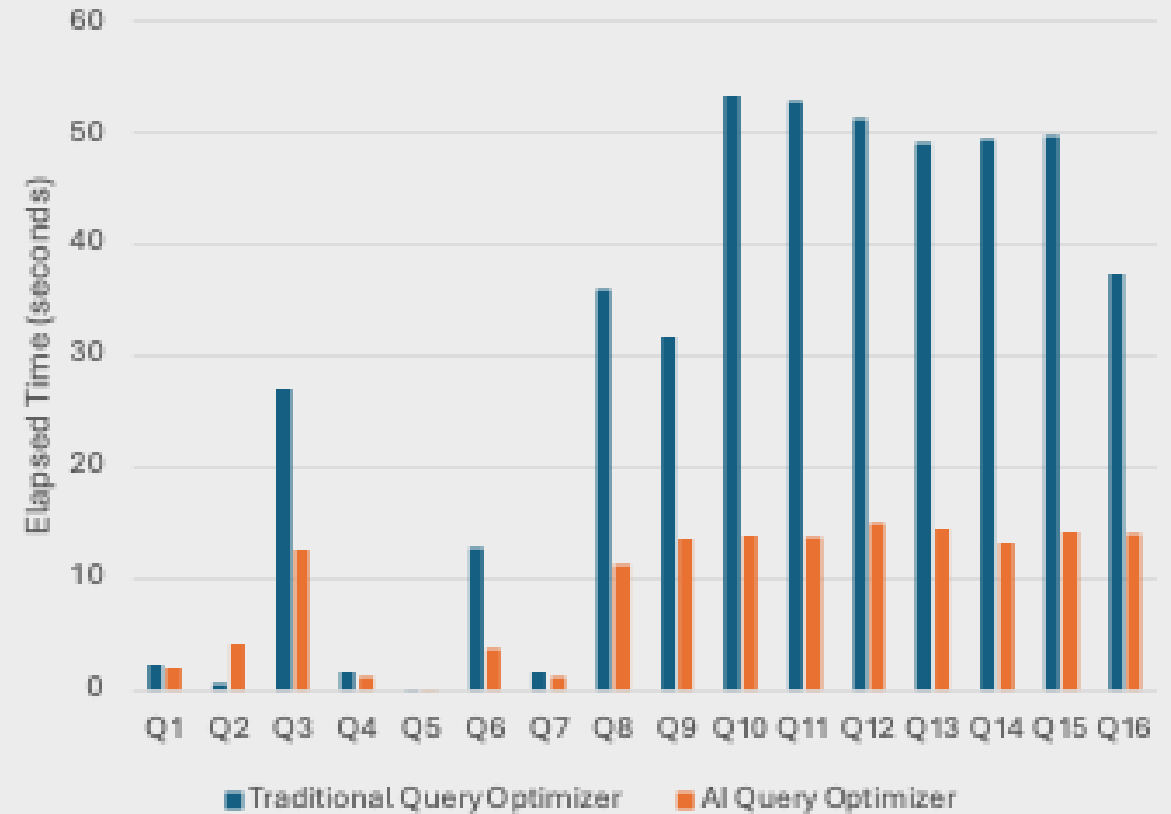DDL to disable/enable, revert, and drop models

Benefits

3X benefit in scenarios simulated in-house
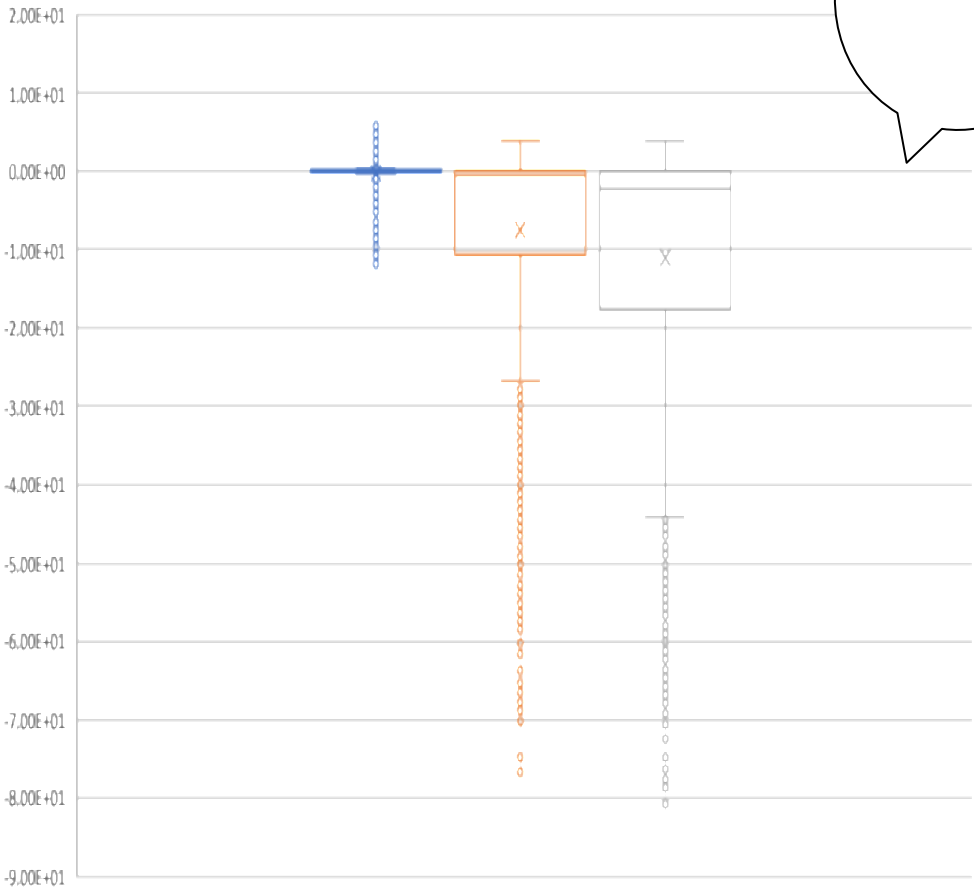
In practice the average benefit will depend on workload

Minimize errors in cardinality estimates produces reliable performance

Db2 AI Query Optimizer

Security Enhancements in Db2 12.1 (1|2)

- Trusted Context / Connection
  - Audit Exceptions for trusted applications to limit auditing
  - Define a Trust procedure to implement custom logic to identify Trusted Ctx
  - Generate an AppToken to identify a custom application
  - Role can be used for package execution/static SQL (Aha! 407)

- Improve update/upgrade with RCAC dependency on system objects (catalog views, functions etc.) (Aha! 1004)

- JWT authentication exposed as Global Variable for use with RCAC (JWT available since 11.5.4)

- Behavior Changes
  - DBADM extended to support tablespace and buffer pool creation
    - DBADM can create automatic storage tablespaces defined on SYSADM created storage groups
    - DBADM can create buffer pools (instance_memory still set by SYSADM)
  - DBADM no longer granted DATAACESS by default.
  - PUBLIC no longer granted by default on database creation
    - CONNECT, IMPLICT_SCHEMA, CREATETAB,BINDADD, USE on USERSPACE1, CREATEIN on SQLJ and NULLID schemas
    - No Change existing databases ie. No revokes issued on upgrade.
  - Hostname Validation ON By Default

Security Enhancements in Db2 12.1 (2|2)

- TLS / SSL Enhancements
  - Change to KMIP SSL label now an online operation
  - TLS 1.3 – on by default at server
  - TLS + SERVER auth can be used to connect in place of SERVER_ENCRYPT authentication (SERVER_ENCRYPT deprecated)
- Multiple behavior changes related to FIPS, to leverage major release boundary.
  - E.g. SERVER_ENCRYPT is blocked in STRICT_FIPS mode

- Discontinuations:
  - TLS 1.0 and 1.1 removed from Db2 server
    - Also removing support for SHA-1 and 3DES cipher suites
  - 3DES with native encryption
    - Existing database & backups continue to decrypt.
    - New databases & backups needs to be AES (Reading from old 3DES backups still ok)
  - DATA_ENCRYPT authentication
    - Replaced by TLS/SSL
  - CLIENT Authentication
  - FED_NOAUTH DBM CFG
  - Change password plugin
    - Default OS plugin provides equivalency. Legacy from earlier implementations

Columnar Improvements in 12.1

- Enhanced Insert and Compression enabled by default
  - Page based string compression: very effective for compressing high cardinality hex, date, timestamp, numeric data stored in string data types
  - Trickle Insert performance improvements
  - Deferred Synopsis creation for small tables

- Schema Evolution: DROP and RENAME columns now supported
  - ADMIN_MOVE_TABLE – online columnar table moves
  - V12 will see schema evolution evolve throughout the mod packs

- Compact Varchar Extended to Hash Join
  - Individual queries saw performance improvements of 5x – 60x!!
  - Overall memory requirements reduced by 75% - 80% (4x -5x "less")

Columnar Improvements in 12.1
Trickle Feed Insert Enhancements

- Used only when small number of rows are being inserted (aka data trickling in).

- Inserted rows are split to one or more "insert groups" – still columnar format just inserting more columns per page.

- Number of insert groups depends on types of columns, average length, etc. But generally, will be much less than total number of columns.

- Data going into these insert groups are not compressed.

Insert Groups

Insert Group Page 23; startTSN 42

CG 0

CG 1

CG 2

Insert Group Page 111; startTSN 42

CG 4

CG 5
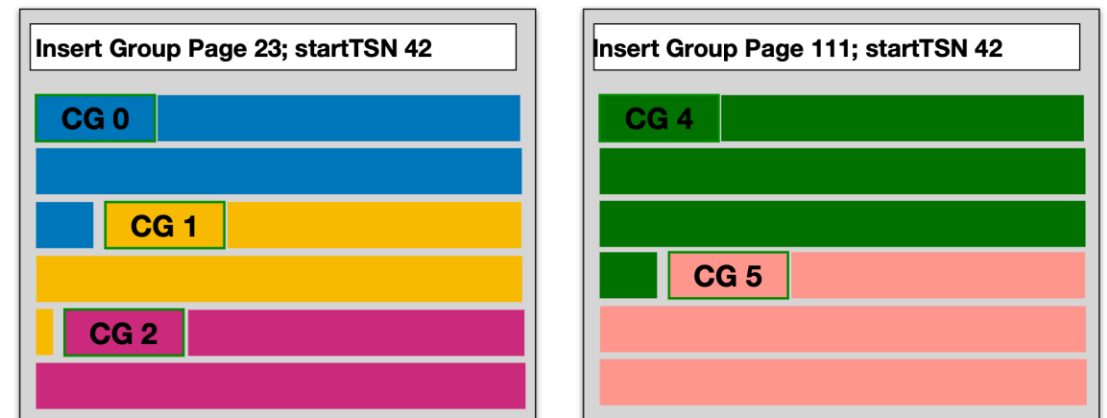
- Flexible assignments of column groups to insert groups.
  - Fixed-length vs. variable-length, large varchar columns.
  - Co-existence with other approaches, e.g., text compression.

Columnar Improvements in 12.1
Trickle Feed Insert Enhancements

- The insert group pages are almost always temporary -- a window of the most recent 'trickle' inserts. Exception is small tables.

- Insert group pages/rows are automatically moved (aka split) to the single column per page format.

- The split is done synchronously. Triggered as soon as it's predicted that full column group pages can be created.

Split Insert Group
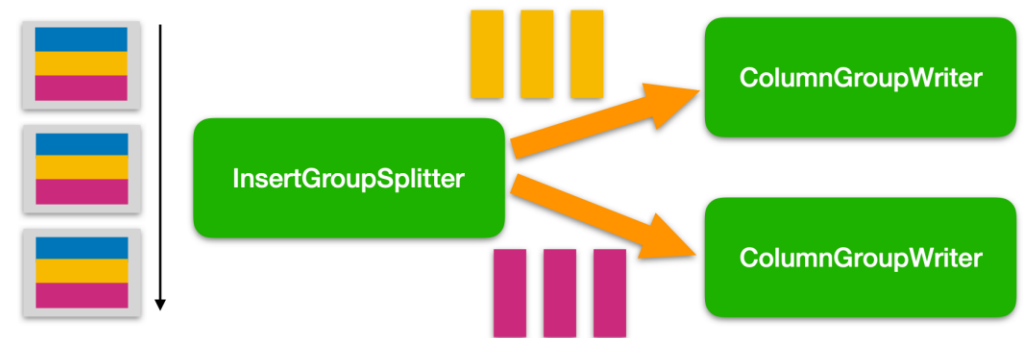
- **Synchronous** within a transaction (same approach as used for page compression).

- Tries to split when it thinks that a column group page can be filled.
  - Very **few pages** are **in Insert Group format**.

- Each column group is processed independently.

Columnar Improvements in 12.1
Compact Varchar (CVC): Recap of the journey

- Why?
  - Improved memory stability and performance of the columnar engine
    - Specifically for workloads involving queries with VARCHAR columns
    - Dramatically reduce Out of Memory (OOM) / -955C errors
    - Improve individual query and overall workload performance
  - Reduce need to modify schema to better size varchar columns

- Phased approach:
  - Vector and Work Units ✔
  - Group by and Join ✔
  - Aggregation and OLAP ✔
  - M to N Joins: new

Columnar Improvements in 12.1
Compact Varchar Hash Join

- CDE Hash Join improvements:
  - Used for Equality Joins in CDE
  - Reduce memory requirement for large "Payloads"
    - i.e. Inner/Dimension tables columns
  - Improve performance for joins with large "Payloads"
  - HSJoin converted to use new "Compact Block Store" (CBS)
  - Variable length inners and wide inners are stored in the CBS
- CVC Extended to cover all variable length data types
  - VARGRAPHIC, VARBINARY, LOB descriptors

Columnar Improvements in 12.1
Compact Varchar Hash Join

- Evaluation:
  - Variable length "Payloads":
    - "Payloads" are smaller because they are stored compacted
    - Performance improved overall by 2.4x - 2.5x across a wide range of Sort Heap sizes (600K, 300K, 150K, 75K pages)
    - Individual queries saw performance improvements of 5x – 60x!!
    - Overall memory requirements reduced by 75% - 80% (4x -5x "less")
    - Many queries no longer spill, leading to the huge improvements
  - Fixed Length Payloads
    - "Payloads" are the same length, but handled as a "blob" by Hash Join
    - Performance improved overall by 34%– 59% across a wide range of Sort Heap sizes (600K, 300K, 150K, 75K pages)
    - Individual queries saw performance improvements of 3.7x – 4.5x!!
    - Overall memory requirements reduced by 20% - 50% (26% - 2x "less")

Database Upgrade Availability
HADR Read Access on standby during upgrade

- HADR now allows read access on standby during primary upgrade
  - New upgrade procedure: upgrade primary database first while keeping standby database at v11.5 to provide read only access
  - After primary database has completed the upgrade, move applications back to the primary then upgrade the standby database
  - Trade-off: read access during upgrade of primary vs no HA protection until standby completes upgrade and reaches PEER state.
  - If multiple standbys, the following order to avoids gap
    - Upgrade principle standby, then primary, while keeping aux standby for read-access
    - Upgrade aux standby after upgrade of primary is complete

Backup Performance
Intra-tablespace parallelism (1|2)

Single node with 1FC Card:

- 2.7X faster in extreme skewed case, best scenario

- Flat for balanced case

- Improvement limited by headroom of IO bandwidth on the system

Standalone Online Backup Elapsed Time (sec) on EE
for Skewed and Balanced Cases
1x 8Gbps Fibre Channel Card

Hardware:
- Power8 with 24 physical cores (96 logical CPUs)
- 256GB RAM
- IBM XIV Storage System connected by 1x 8Gbps FC card

2.7X Faster
1.9X Faster
1.7X Faster
1.3X Faster
Not Regressed
Not Regressed

Online Backup Elapsed Time (Seconds)

900
800
700
600
500
400
300
200
100
0

1 Container: 1x200GB+9x1MB
2 Containers: 1x200GB+9x1MB
1 Container: 2x100GB+8x1MB
2 Containers: 2x100GB+8x1MB
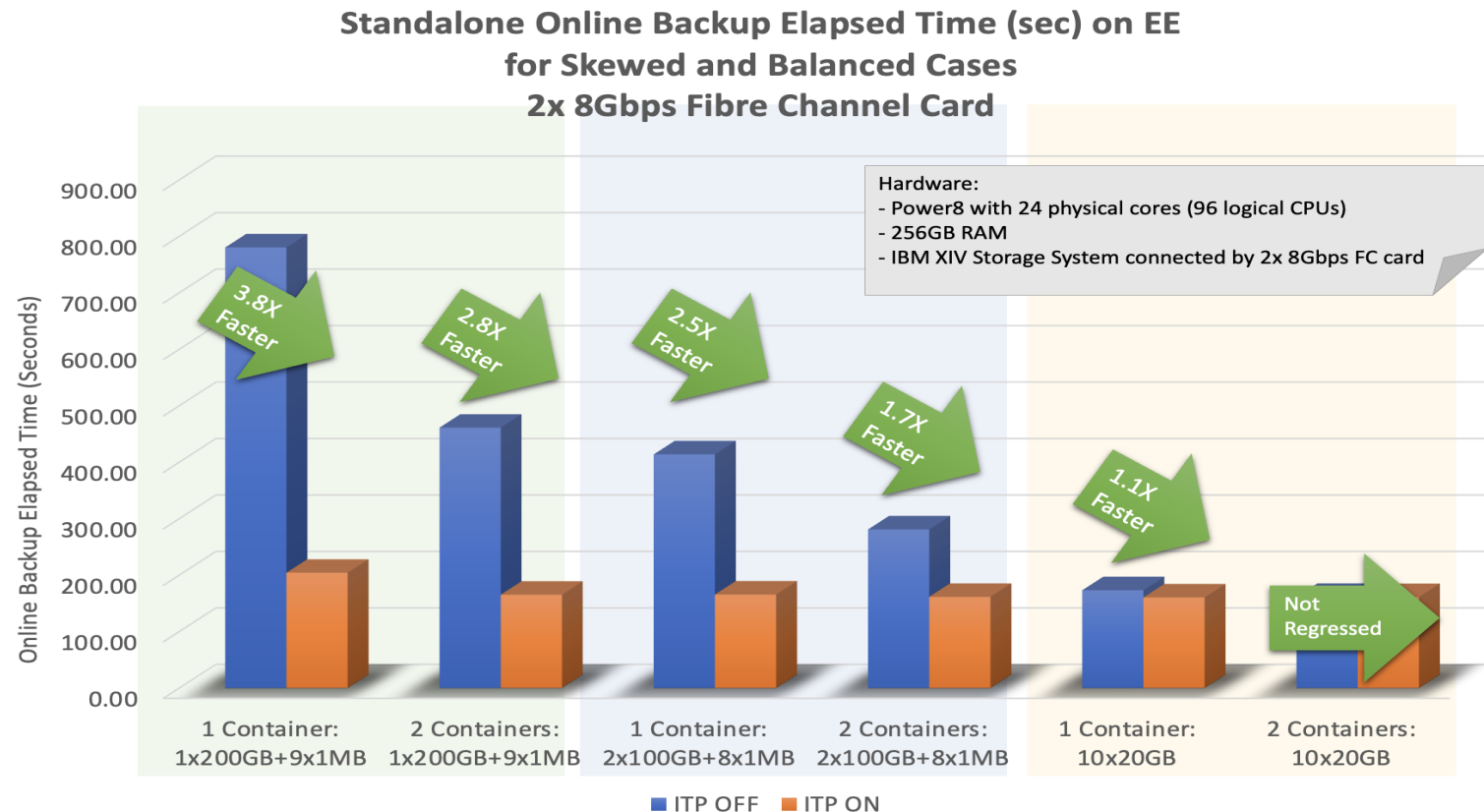1 Container: 10x20GB
2 Containers: 10x20GB

■ ITP OFF ■ ITP ON

Backup Performance
Intra-tablespace parallelism (2/2)

Single node with 2 FC Cards:

- 3.8X faster in extreme skewed case, best scenario.

Standalone Online Backup Elapsed Time (sec) on EE
for Skewed and Balanced Cases
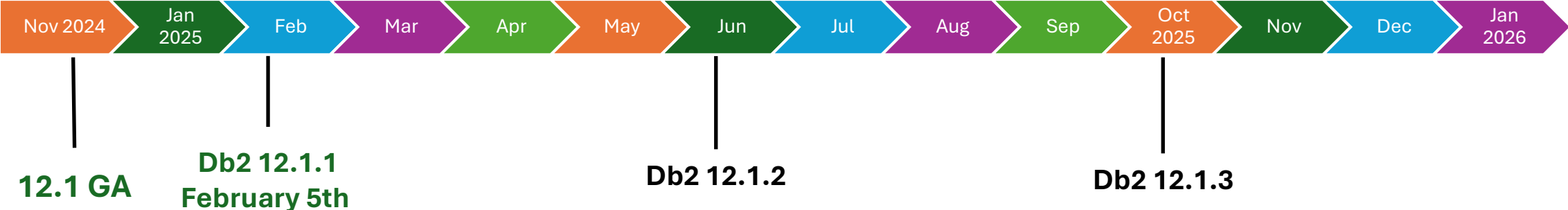2x 8Gbps Fibre Channel Card

Things to be aware of ….

- Linux pacemaker will be the only integrated cluster manager
    - including pureScale
    - AIX remains with TSA
- ICU only latest version will be carried forward
    - mod packs may update ICU versions – ICU 74 ships with GA

Db2 12.1 mod pack our current thinking
But subject to change

Nov 2024	Jan 2025	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct 2025	Nov	Dec	Jan 2026

12.1 GA

Db2 12.1.1
February 5th

Db2 12.1.2

Db2 12.1.3

12.1.X Candidates

12.1.1

SVM uplift:

- SLES 15 SP6 – pureScale support
- NVMe reservation

Online Index Reorg for pureScale

AI Optimizer Explain Additions

Columnar:

- FFNR performance improvements
- Explain Enhancements

TBSPACEADM

- Bufferpool & Tablespace authority

12.1.2

Vector and Similarity Search

pureScale: AWS Elastic Fabric Adapater (EFA) support

Columnar schema Evolution: Decimal Precision

World Writeable File Permissions Removed (optional)

Data Masking at read

Remote Storage: Azure Support

12.1.2+

Reorg enhancements

- Online Reorg with Global Index

pureScale: Online topology Changes

Remote Tablespace Support

- PPCLE support
- Externalized to non-container
- General performance enhancements

One Last Thing

Db2 12
vs PostgreSQL 16.4

5.4x

**faster
than
PostgreSQL**

2.1x
faster

2.74x
faster

5.4x
faster

r6i.4xlarge

r6i.8xlarge

r6i.16xlarge

■ Db2 12   ■ PostgreSQL 16.4
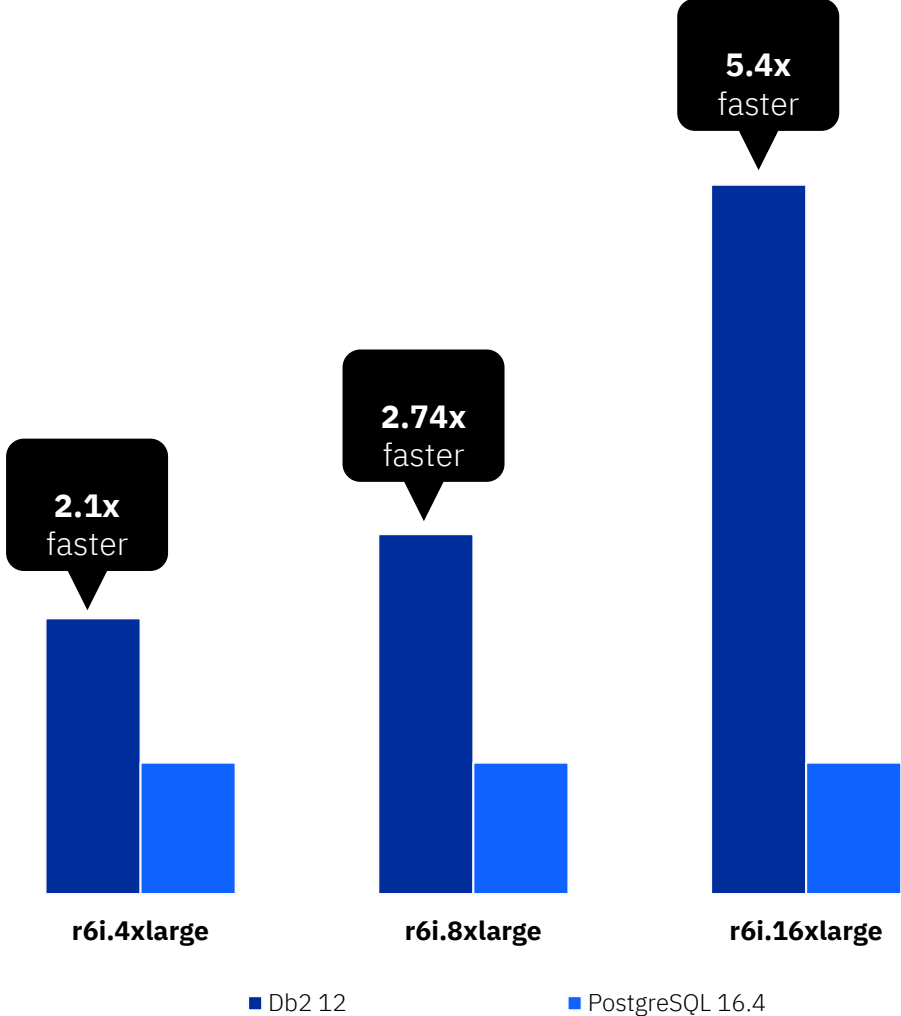
Unofficial TPC-E benchmark for OLTP workloads run on AWS EC2 infrastructure

TPC-E Configuration
– **40k**, **80k**, **160k** customers as a function of db size
– **40**, **50**, **80** connections
– **60** trading days of data

AWS EC2 Instances
– **r6i.4xlarge**
  16 vCPUs / 128GB mem
– **r6i.8xlarge**
  32 vCPUs / 256GB mem
– **r6i.16xlarge**
  64 vCPUs / 512GB mem

Thank You
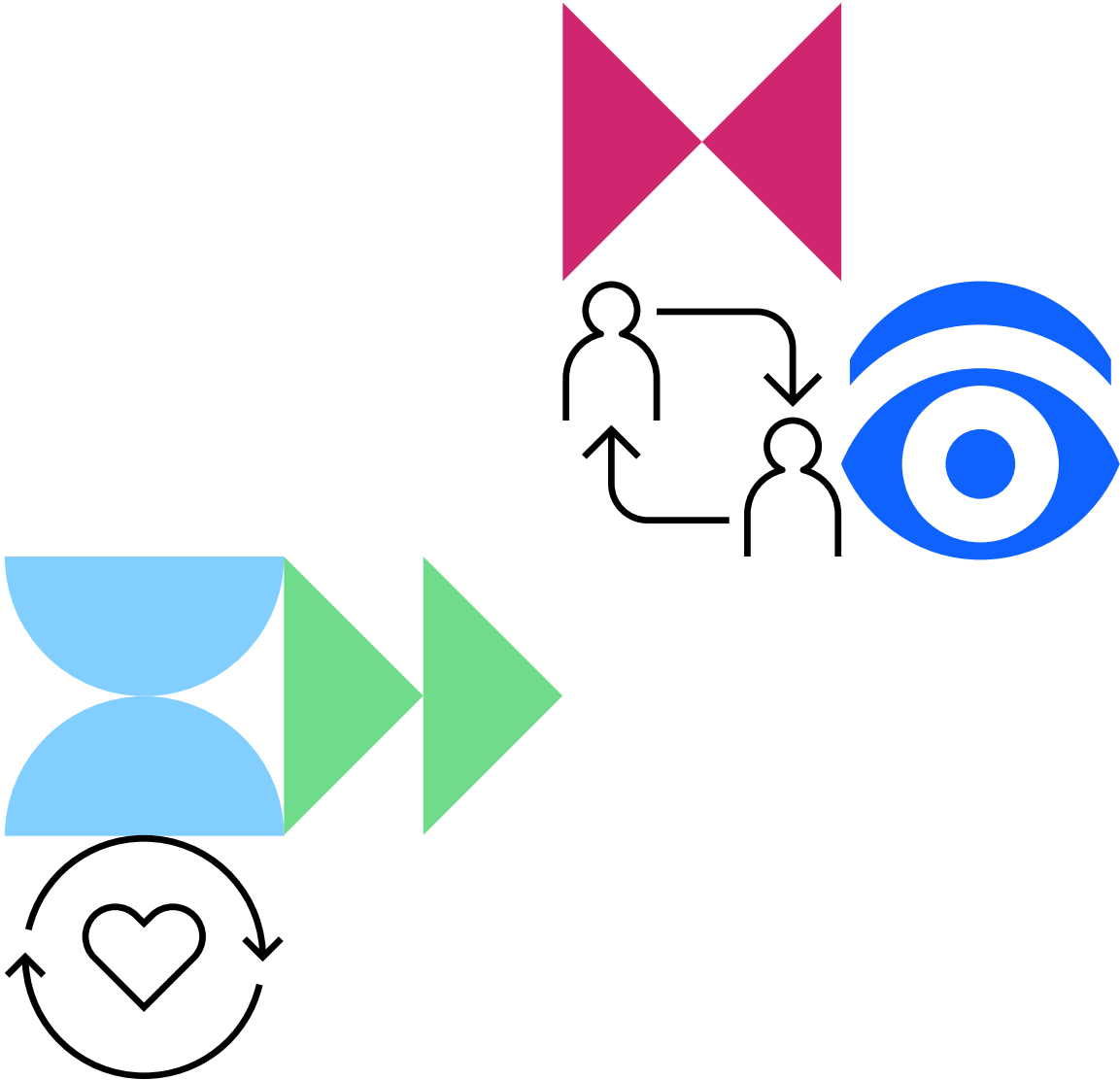
- Mike Springgay
  IBM, Db2 Chief Architect

- springga@ca.ibm.com