April, 2018

Db2 for z/OS Update

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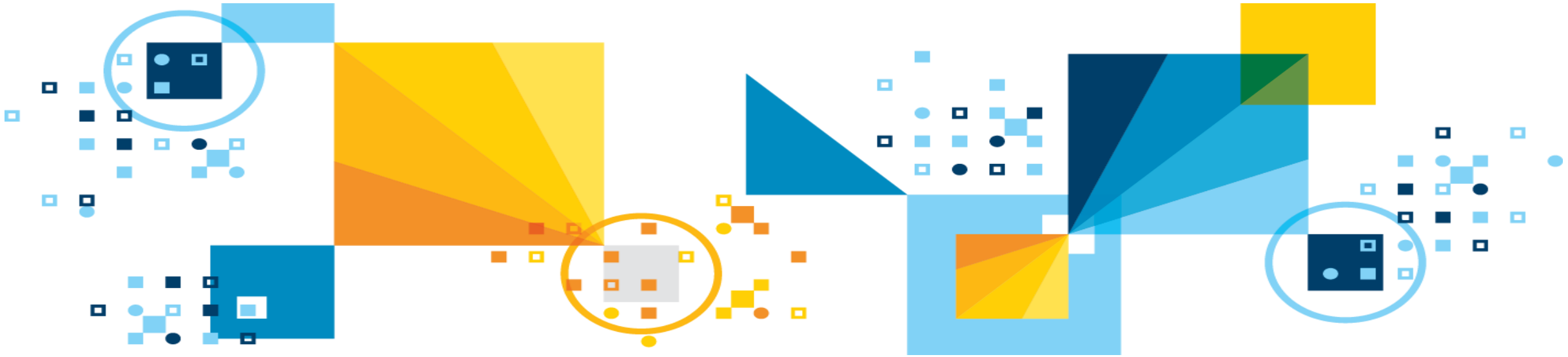

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Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

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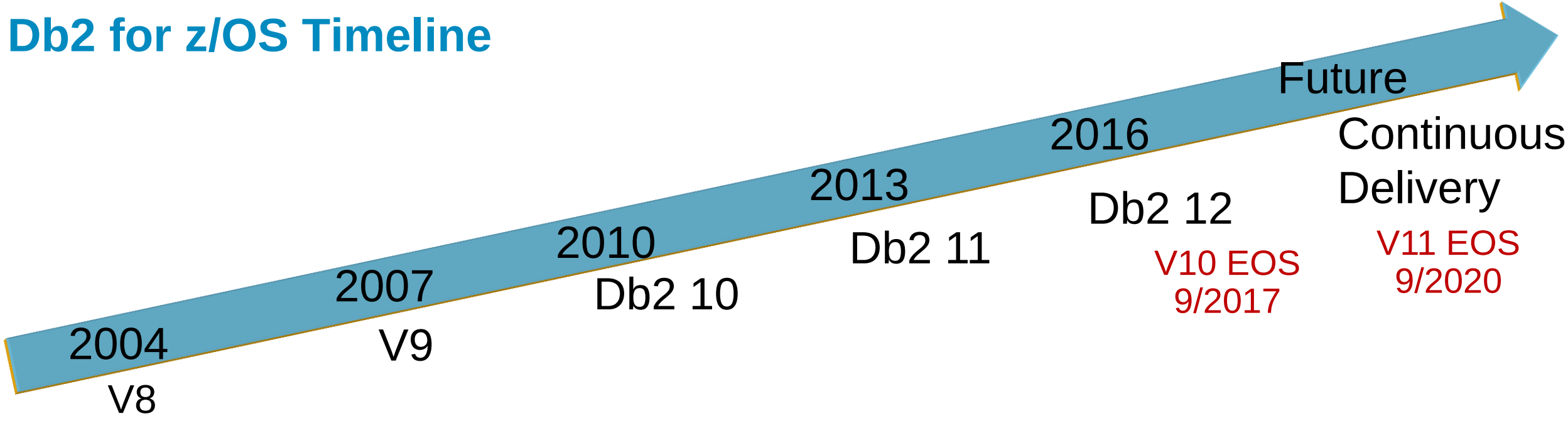
Db2 for z/OS Timeline



Db2 12 GA October, 2016

Db2 12 adoption rate about the same as V11

Quality metrics, continuous improvement: V12 better than V11 which is better than V10

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Db2 12 for z/OS Highlights

Redefining enterprise IT for digital business and the mobile app economy

Scale and speed for the next era of mobile applications

Super fast ingest rate -- over **11 Million Inserts per second** for IOT, Mobile and Cloud*
280 trillion rows in a single Db2 table, with **agile partition technology**
DRDA Fast Load for easier loading of data from distributed clients

In-Memory database

Advanced in-memory techniques in Db2 12 means faster transactions with less CPU

Deliver analytical insights faster, expand to more applications

- **2-10x improvement** for modern analytics workloads
- Individual modern analytic queries may see up to 100x improvement**
- **JSON** data management improvements
- SQL improvements such as SQL pagination, enhanced MERGE, piece-wise DELETE

Easier to manage, higher availability

- **Db2aaS** APIs and automation for self-service provisioning of resources
- **Automated** admin operations such as RUNSTATS
- More schema and partition flexibility
- TRANSFER OWNERSHIP for easier security admin
- Dynamic SQL plan stability

The launch pad for Continuous Delivery

*: Under dedicated environment using 12 way data sharing on z13, insert against one table (PBR/Member Cluster) from zLinux clients. All partitions were GBP dependent and logging enabled. Our record is, 11.7 million insert per second without index, 5.3 million insert per second with index defined.
** Modern analytics queries evaluated include SQL constructs such as UNION ALL, outer joins, complex expressions (CASE, CAST, scalar functions etc)

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Db2 for z/OS and IBM z14 Hardware Synergy

DBMS Technology Leadership

- Db2 for z/OS is differentiated in the marketplace through hw/sw integration
- z14 includes several new hardware features which benefit Db2 workloads
- Integration points for Db2:
  - Crypto hw acceleration for faster transparent data encryption
  - zHyperLinks for ultra-fast Db2 log write I/O and database read I/O
  - New hardware for improved data compression for Db2 tables
  - More large memory – up to 32TB single server
  - New hw for order-preserving compression for Db2 indexes
  - IDAA on IBM Z

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Db2 Analytics Accelerator Version 7.1

New Deployment options!

Db2 Analytics Accelerator Version 7.1: Two deployment options

IAS

Z

In Version 7.1, Db2 acceleration can be implemented within different environments:

1. On an appliance - **Accelerator on IBM Integrated Analytics System**

2. On a SW appliance installed on the z14 mainframe - **Accelerator on IBM Z**

Based on IBM's premier analytical engine, Db2 Warehouse software

Both new options offer

- the same functionality
- the same API
- the same implementation
- full transparency for Db2 applications
- flexibility in moving between the forms

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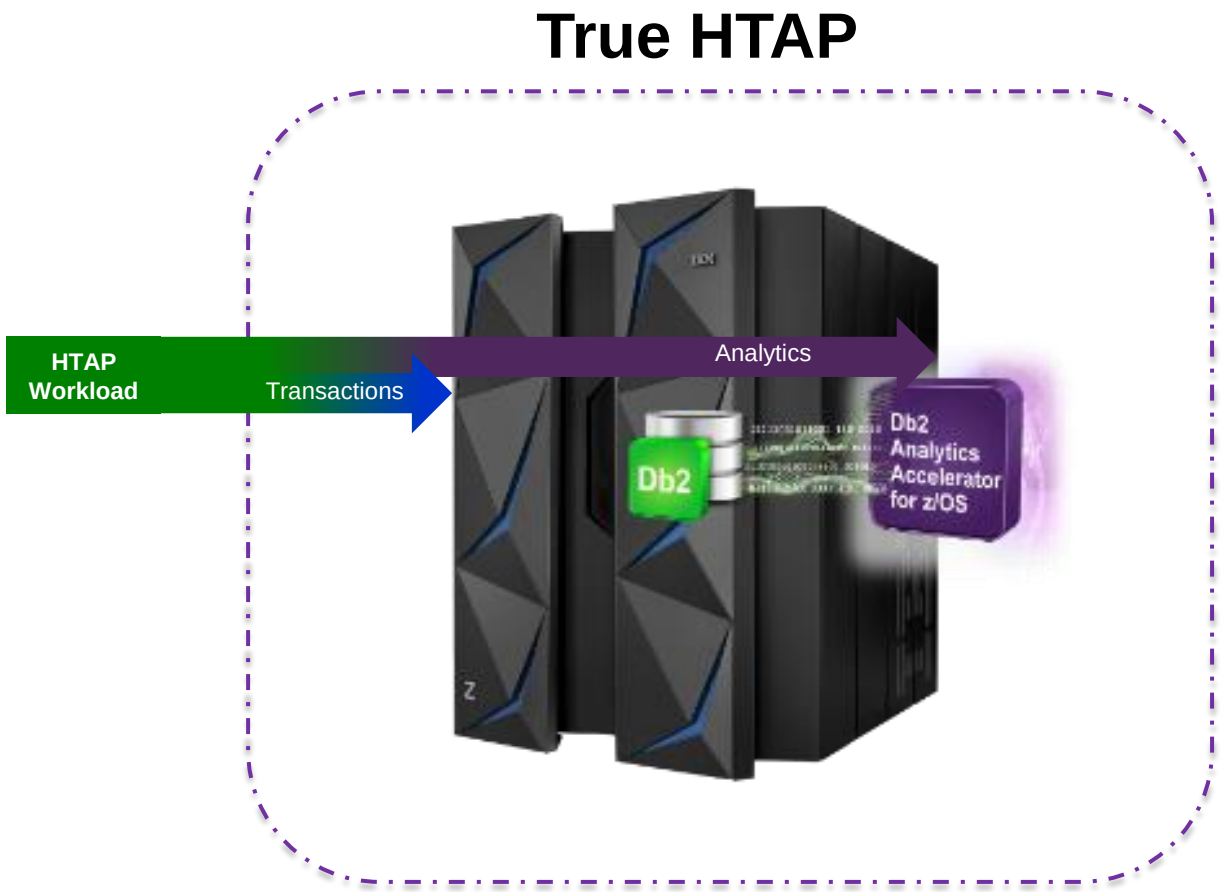
What else is new in 2018: Zero Latency HTAP with no cost



Top priority theme -
Hybrid Transactional/Analytical Processing

- Real-time processing on real-time data on “best-of-breed” technologies for transactional and analytical workload
- A patented *just-in-time* currency replication protocol grants transactional data coherency for analytical requests
- The result is a unique-in-industry, heterogeneous scale-out solution for enterprise-grade HTAP

No SW Charges for real time replication between Db2 and the Accelerator

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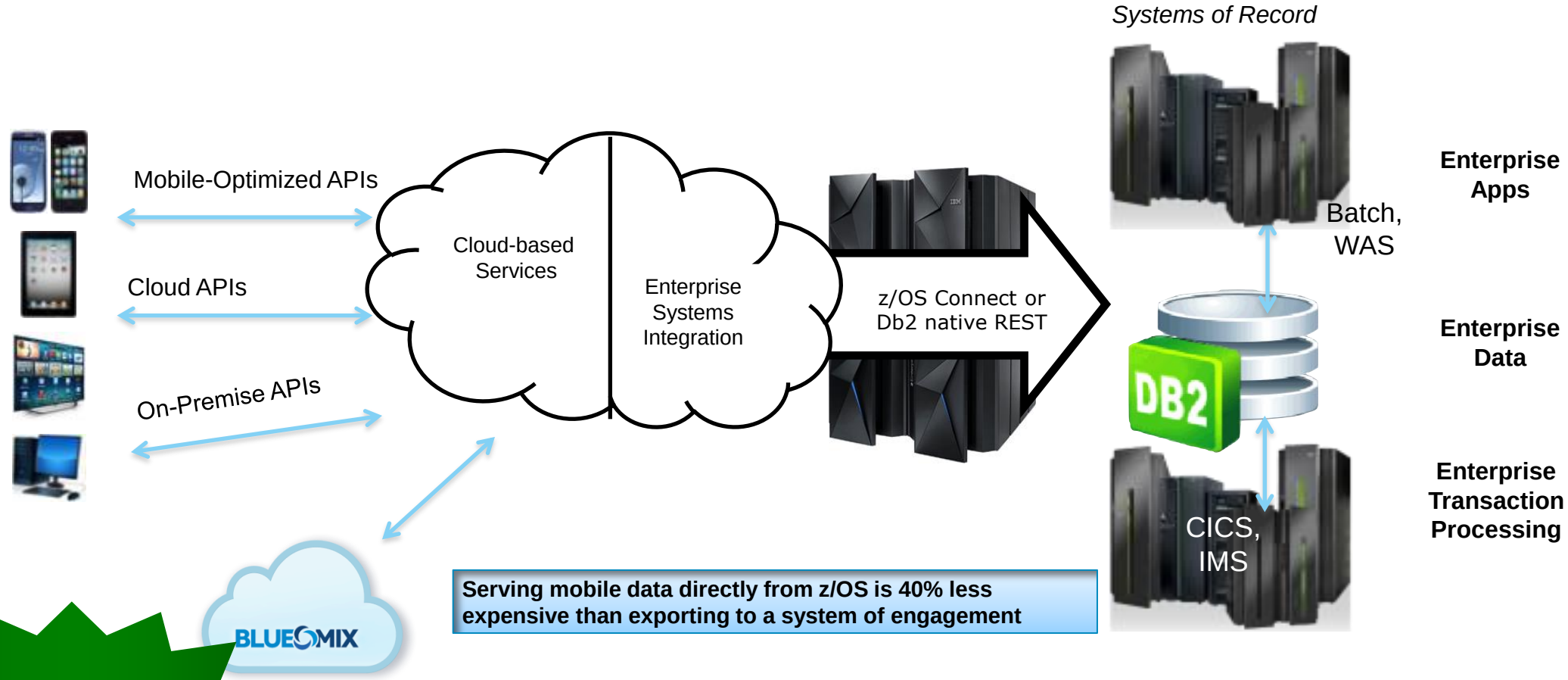
Db2 Data as a Service

Db2 Cloud/Mobile modernization with RESTful services and JSON



Native Db2 REST service provider now available

- Many modern application developers work with REST services and JSON data formats
- Db2 12 and Db2 11 support Native REST services
  - Easier DBA management of Db2 RESTful services, means easier adoption
  - Integrates with z/OS Connect Enterprise Edition (zCEE) for fuller RESTful API support

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Recent Deliveries

- IDAA
  - Special Register and Bind Option for User-Specified Accelerator – February 2017
  - CAST of GRAPHIC/VARGRAPHIC support for IDAA – February 2017
  - Multi-Row Insert for Accelerator Only Tables – March 2017
  - IDAA Federation – July 2017
  - IDAA V6/V7 – October 2017
  - IDAA HTAP Dynamic Query Support – October 2017
- z14 Synergy
  - HyperLink Support for Random Database Reads – September 2017 (Phase 1), December 2017
  - Transparent Dataset Encryption Support – October 2017 (V11, V12), December 2017 (V12 FL 502)
  - Huffman Data Compression Support – April 2018 (planned)
- Performance Enhancements
  - zIIP enablement for RELOAD phase of LOAD and REORG Utilities – February 2017
  - IMS Attach Connection Pooling Support – February 2017
  - Partition by hidden ROWID columns – May 2017
  - zIIP enablement for LOAD PARALLEL RELOAD phase – June 2017
  - RUNSTATS Performance Improvement for Single Colgroups – August 2017 (V11), November 2017 (V12)
  - CHECK LOB Utility Performance Improvement – August 2017
  - Access Path Improvement To Encourage The Tables With Good Filtering To Be Joined Earlier – October 2017
  - REORG Performance Improvement during UTS conversions – October 2017

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Recent Deliveries

- Utility Enhancements
  - Support new INVALIDATECACHE option in M100 – January 2017
  - Table Schema Checking Enhancement for Repair Catalog – February 2017
  - Additional LOAD IGNORE Options for Ignoring Rejected Records – May 2017
  - Inline image copy for LOAD RESUME (v11, v12) - November 2017
  - LOAD SHRLEVEL CHANGE parallelism retry logic (v11, v12) - February 2018
- Serviceability, Availability, Usability Enhancements
  - Enhanced Monitoring for in Index In-Memory Optimization – May 2017
  - Improved Reporting of Real Storage Statistics– July 2017
  - Set Partition Key Columns as Updateable for Tables Created Prior to V5 – August 2017
  - Enhanced Monitoring for Insert Algorithm 2 Capabilities – October 2017
  - Disable or Re-enable Insert Algorithm 2 Capability via ZPARM – November 2017
  - Enhanced Metadata Self-Description Capability (Storing Version 0 Info) – November 2017 (V12), January 2018 (V11)
- GDPS Active /Active with zero data loss
  - CDDS Online Recovery and Cleanup – November 2017
  - CDDS print utility and recovery enhancement – March 2018

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Recent Deliveries

- Application Developer self-service and productivity
  - LISTAGG Support via FL501 – March 2017
  - DB2aaS improvements: Provision Schema With z/OSMF Workflows – March 2017
  - Native REST Client Certificate Support – June 2017
  - Native REST Trusted Context Support - June 2017
  - Native REST Persistent Connection Support – November 2017
  - Native REST TSO BIND/FREE Service Support – November 2017
  - COBOL PL/I Co-processor from HFS – February 2018
  - Query performance improvements for join predicate pushdown – January 2018
    - V12 APAR PI89564. 40 SAP Core Banking queries tested:

	V12 Base (As-is)	After enhancement (To-be)	Delta
Average elapsed time	625.285	0.521	-99.9%
Average cpu time	341.389	0.446	-99.9%

  - Allow MODIFIES SQL DATA function to be invoked in a fullselect – March 2018

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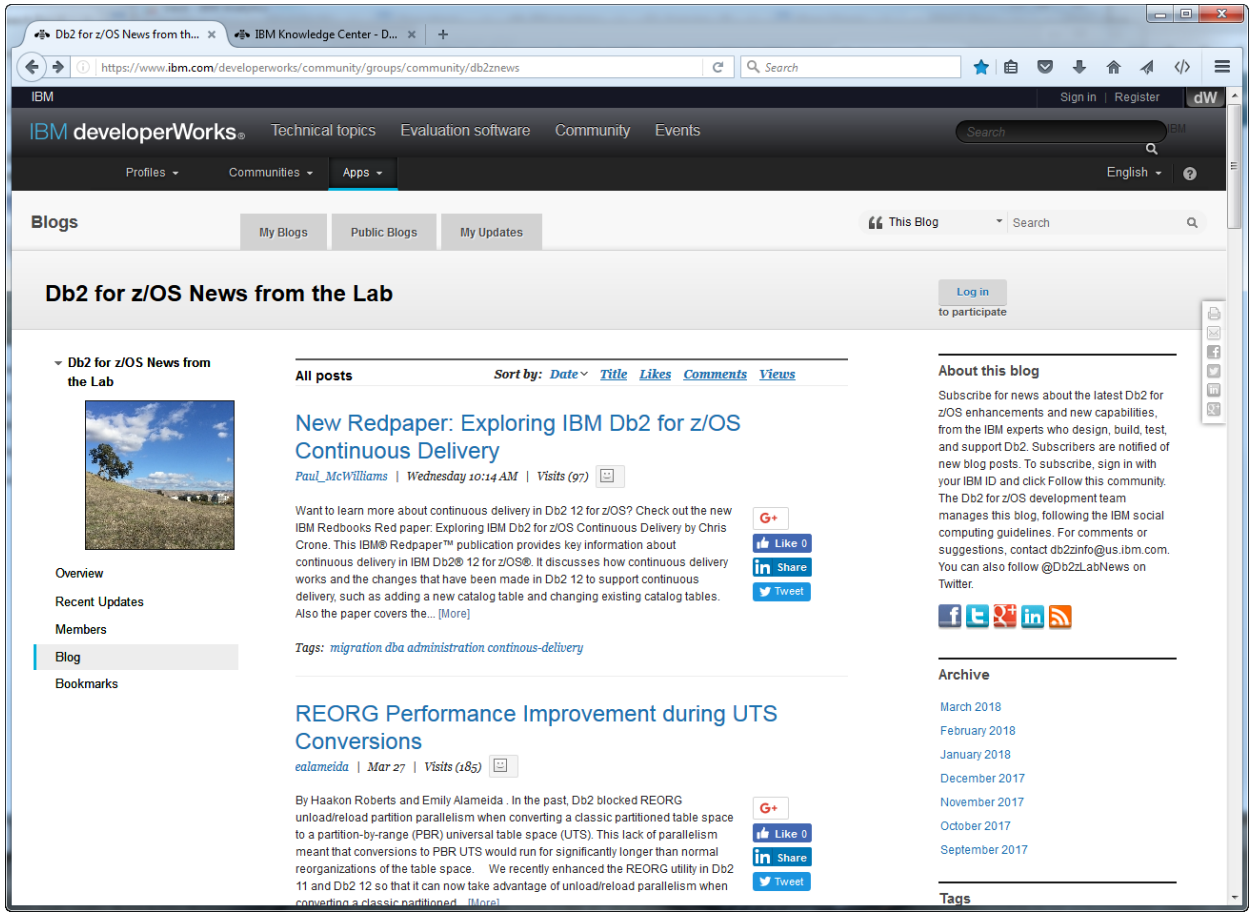
Db2 for z/OS News from the Lab blog

http://ibm.biz/db2znews



Get the latest news from the IBMers who design and build Db2!

- New capabilities in Db2 12 for z/OS continuous delivery
- Enhancements in Db2 11 for z/OS
- Helpful tips and best practices from Db2 for z/OS development

– Join the conversation

- Subscribe to follow the blog
- Become a member to comment
- Follow us on Twitter: @Db2zLabNews

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Db2 12 Function Levels – Our Future Delivery Model

Start slow, speed up as we go

- Quality, stability is priority #1
- Some features will be retrofit to V11, this will diminish over time
- Function levels (FLs) are the mechanism to activate new features on V12
  - System level and application level controls
  - FL 500 is base V12 NFM. FLs 501, 502, … beyond that
  - Goals: faster delivery, easier to consume for customers (compared to traditional release migration)

FL 501 – 1st post-GA delivery

- LISTAGG
- SAP published certification for FL 501 in Sept., 2017

FL 502 – 2nd delivery (planned April, 2018 – APAR PI95511)

- TDE usability improvements, casting numeric to GRAPHIC/VARGRAPHIC
- New catalog level

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Db2 for z/OS Strategy

Analytics

- HTAP
- Db2/IDAA integration

Cloud

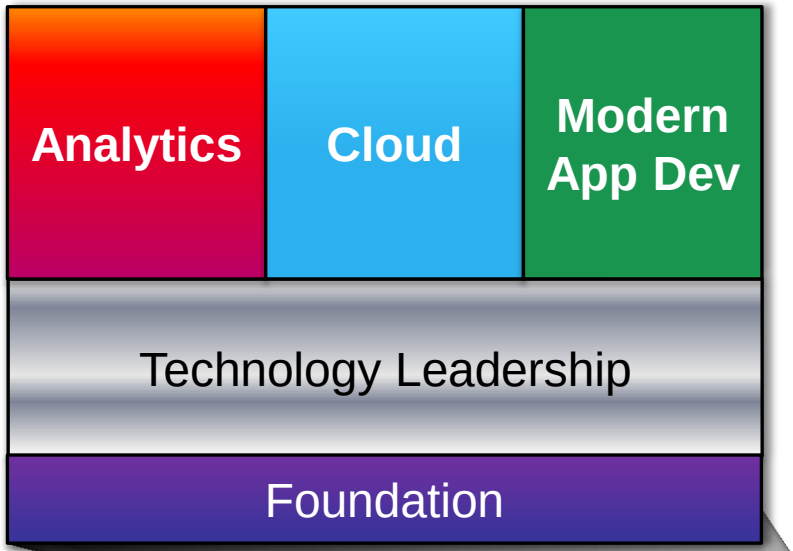
- Application developer self-service
- DevOps improvements
- System simplification and autonomics
- Embedded Machine Learning

Modern Application Development

- Leading edge application development features

Technology Leadership

- Security
- Performance, scalability, z integration
- Continuous availability
- Customer requirements



Next Gen workloads with our world class Qualities of Service

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Accelerate Your Upgrade to Db2 12 for z/OS!

Target Audience: Technical Architects, DBA Managers, Project Managers, Leaders

Db2 12 for z/OS Technology Workshop (free)

- Comprehensive review of capabilities, considerations, preparations & project planning for Db2 12. Contact your IBM account team or send email to Surekha@uk.ibm.com

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Db2 12 – More Information

Db2 for z/OS product home page
https://www.ibm.com/analytics/us/en/technology/db2/db2-for-zos.html

Whitepaper: Db2 12 for z/OS The In-memory Enterprise Database for Transactions and Analytics
http://ibm.biz/BdsyaT

IDUG Db2 12 Technical whitepaper
http://www.idug.org/db2v12whitepaper

“Scaling Progressive SAP Solutions with Db2 12 – Immediate SAP Certification of Db2 12 at IBM General Availability”

Db2 12 GA Announcement
https://www-01.ibm.com/common/ssi/rep_ca/7/897/ENUS216-077/ENUS216-077.PDF

World of Db2
http://www.worldofdb2.com/

Db2 12 – More Information….

YouTube channel for Db2 videos
https://www.youtube.com/user/IBMDb2forzOS/videos

Redbook: Db2 12 for z/OS Technical Overview
http://www.redbooks.ibm.com/abstracts/sg248383.html?Open

Redbook: Db2 12 for z/OS Technical Overview and Highlights
http://www.redbooks.ibm.com/abstracts/redp5444.html?Open

Redbook: Db2 12 for z/OS Performance Topics
http://www.redbooks.ibm.com/abstracts/sg248404.html?Open

Redbook: Db2 12 for z/OS Optimizer
http://www.redbooks.ibm.com/abstracts/redp5445.html?Open

Redbook: Introducing the z14
http://www.redbooks.ibm.com/redbooks.nsf/pages/z14?Open

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Thank You

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