

A decorative graphic in the top left corner consists of several overlapping circles of various colors (yellow, orange, red, purple, blue) that are divided into segments, resembling a stylized sunburst or a cluster of data points.

DB2 11 for z/OS Overview

Speaker Name and Title



DB2 for z/OS Customer Trends

- **Proliferation of mobile and other network-connected devices is driving increases in:**
 - transaction workloads
 - data volumes
 - 24x7 requirements
- **Continued focus on cost containment and resource efficiency**
- **Competitive pressures continue to drive an increasing need for innovation, analytics, and data integration**
- **DB2 for z/OS has leading edge capabilities to support these requirements and DB2 11 makes important improvements**





DB2 11 Major Themes

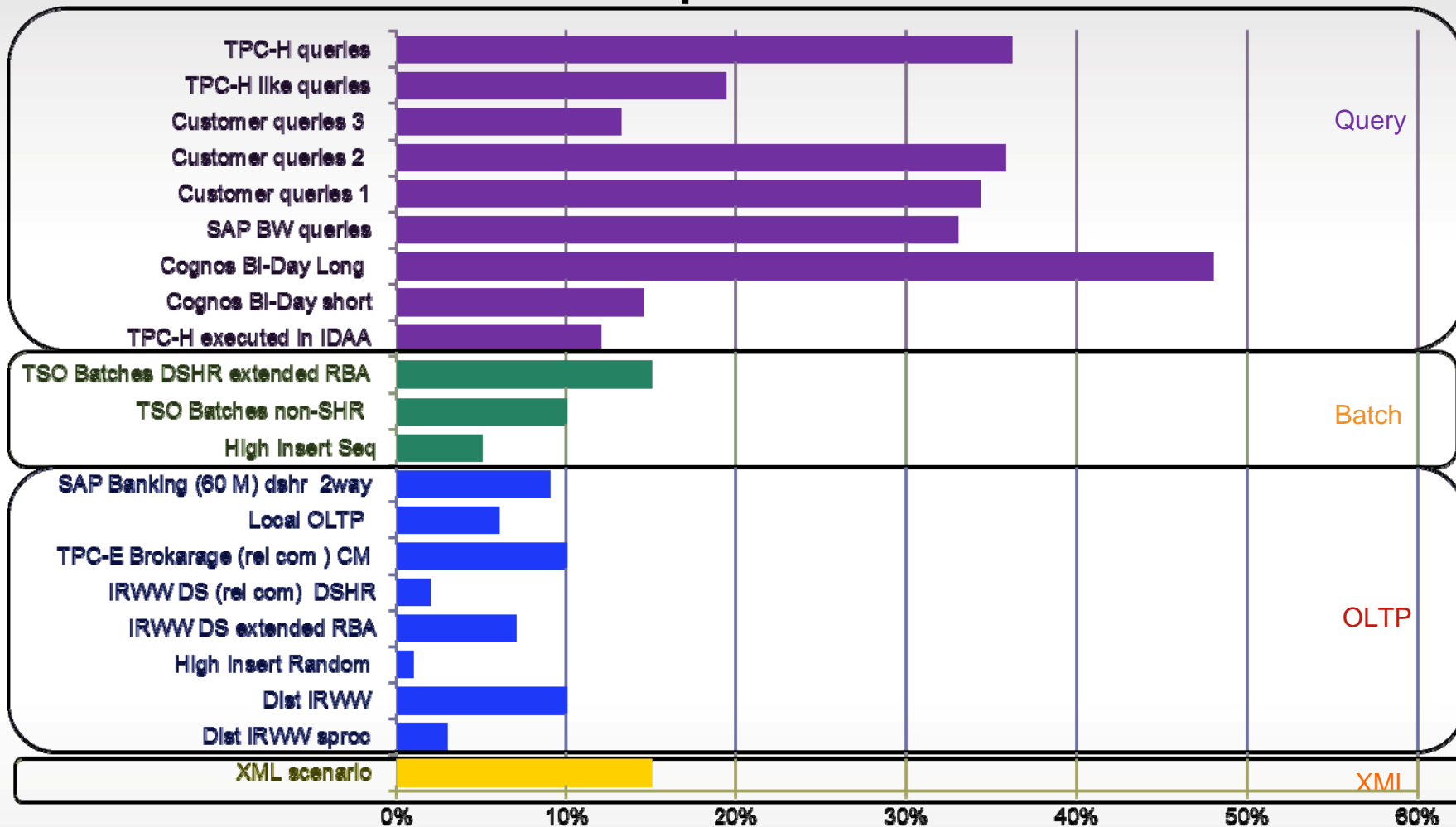
- **Out-of-the-box CPU Savings**
 - Improving efficiency, reducing costs, no application changes
 - Up to 10% for complex OLTP
 - Up to 10% for update intensive batch
 - Up to 40% for queries
 - Additional performance improvements through use of new DB2 11 features
- **Enhanced Resiliency and Continuous Availability**
 - Improved autonomies which reduces costs and improves availability
 - Making more online changes without affecting applications
 - Online REORG improvements, less disruption
 - DROP COLUMN, online change of partition limit keys
 - Extended log record addressing capacity - 1 yottabyte (or 1B petabytes)
 - BIND/REBIND, DDL break into persistent threads
- **Enhanced business analytics**
 - Expanded SQL, XML, and analytics capabilities
 - Temporal and SQLPL enhancements
 - Transparent archiving
 - Hadoop integration, NoSQL and JSON support
- **Simpler, faster DB2 version upgrades**
 - No application changes required for DB2 upgrade
 - Access path stability improvements
 - Product quality/stability – raised the bar





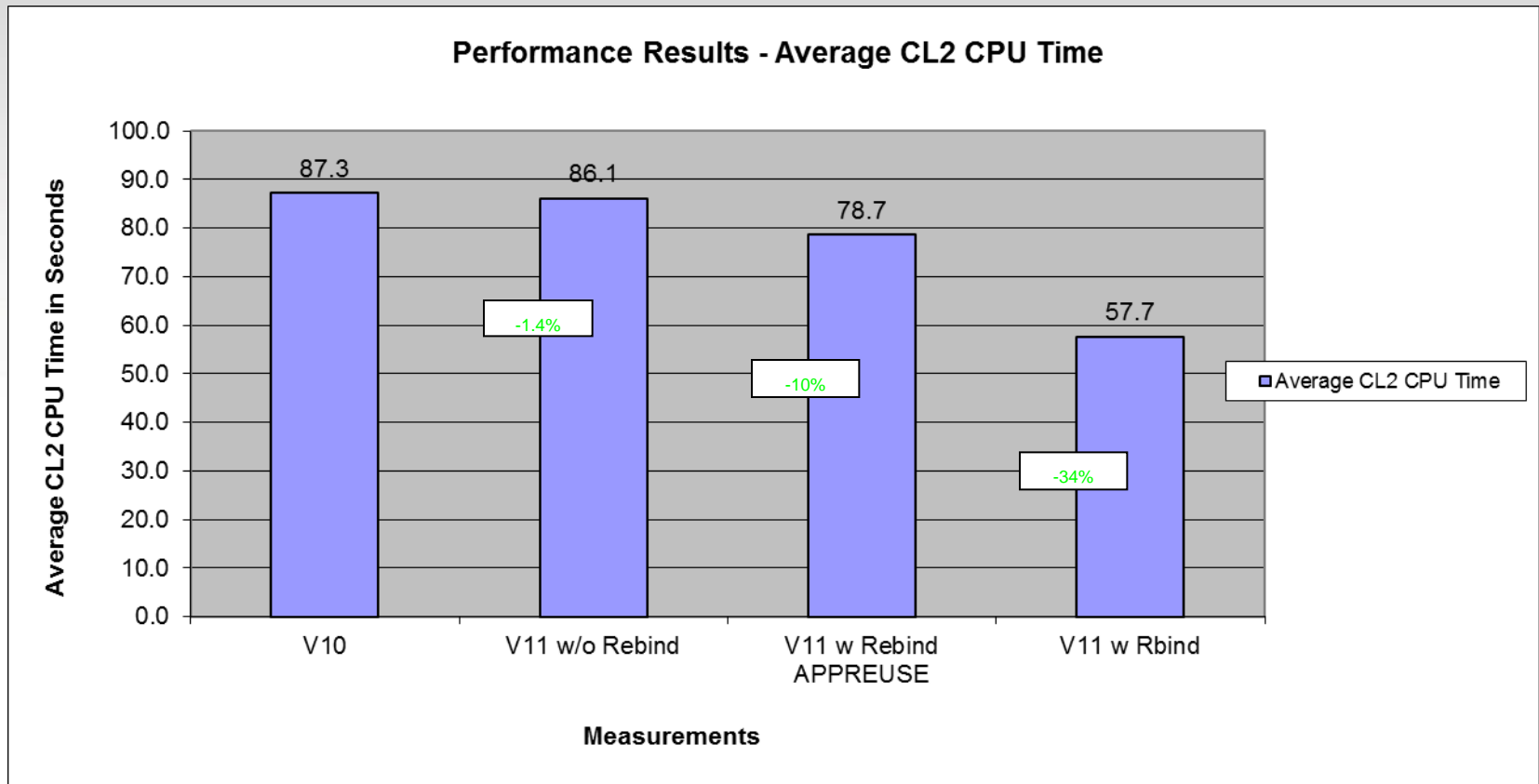
Impressive DB2 11 Performance Results!

DB2 11 % CPU Improvement From DB2 10





TPC-H Using Static SQLPL



- 10% out-of-box improvement with DB2 11 when rebinding with APPREUSE
- 34% improvement in DB2 11 when rebinding to obtain DB2 11 AP



Performance Improvements no REBIND needed – Partial List



- DDF performance improvements
 - Reduced SRB scheduling on tcp/ip receive using new CommServer capabilities
 - Improved autocommit OLTP performance
- INSERT performance
 - Latch contention reduction
 - CPU reduction for Insert column processing and log record creation
 - Data sharing LRSN spin avoidance
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- Automatic index pseudo delete cleanup
- IFI 306 filtering capabilities to improve Replication capture performance
- DGTT performance improvements
 - Avoid incremental binds for reduced cpu overhead *
- Utilities performance improvements
- Java stored procedures: multi threaded JVMs, 64-bit JVM – more efficient

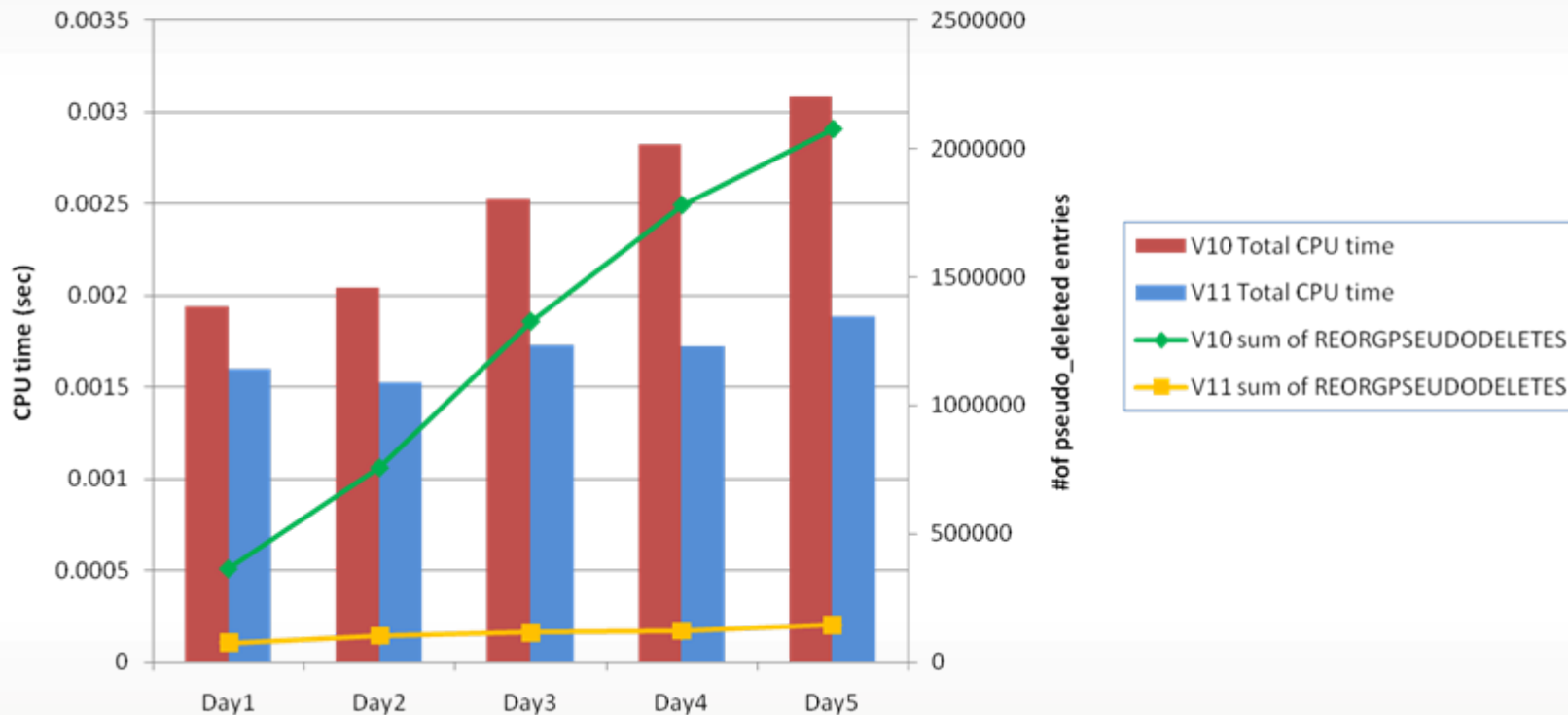


DB2 11 Auto Pseudo Delete Cleanup



- Up to 39% DB2 CPU reduction per transaction in DB2 11 compared to DB2 10
- Up to 93% reduction in Pseudo deleted entries in DB2 11
- Consistent performance and less need of REORG in DB2 11

WAS Portal Workload 5 Days Performance





Performance Improvements

REBIND required – Partial List



- Query transformation improvements – less expertise required for performant SQL
- Enhanced duplicate removal
 - Lots of queries require duplicate removal: e.g. DISTINCT, GROUP BY, etc.
 - Dup elimination via sorting can be expensive
 - New techniques: Index duplicate removal, early out
- In-memory techniques
 - In-memory, reusable workfile
 - Sparse index (limited hash join support)
 - Non-correlated subquery using MXDTCACH
 - Correlated subquery caching
- Select list do-once
 - Non column expressions in the select list can be executed once rather than per-row
- Column processing improvements
 - Xproc (generated machine code) for column processing
- DPSI performance improvements
- Data de-compression optimizations
- Optimizer CPU and I/O cost balancing improvements
- DRDA package based continuous block fetch



Performance Improvements

Sysprog, DBA, or appl effort required – Partial List



- Suppress-null indexes
 - Index entries not created when all values for indexed columns are NULL
 - Reduced index size, improved insert/update/delete performance, compatibility with other DBMSes
 - Improved utility and CREATE INDEX performance
- New PCTFREE FOR UPDATE attribute to reduce indirect references
- DGTT performance improvements
 - Non logged DGTTs
- Extended optimization - selectivity overrides (filter factor hints)
 - Improve optimizer's ability to find the cheapest access path
 - Collect filter factors for predicates in a Selectivity Profile
- Open dataset limit raised to 200K



DB2 11 and zEC12 Synergy



- Faster CPU – 1.25x compared to z196
 - 5.5GHz processors, bigger/faster cache
 - 25% reduction measured with DB2 workloads
- 50% More System Capacity to help consolidation
 - Up to 3TB real memory per server
 - Excellent synergy with DB2 10 and 11 scalability
- New Features that DB2 11 Exploits
 - FLASH Express and pageable 1MB frames, used for:
 - Buffer pool control blocks
 - DB2 executable code
 - 2GB frame support for buffer pools
 - Performance improvement expected for extremely large memory sizes
- New zEC12 GA2 features that benefit DB2
 - zEDC Express for enhanced DB2 SMF data compression
 - RoCE Express for faster, cheaper z/OS to z/OS DRDA communication
 - Preliminary measurements show up to 2x DRDA transaction throughput increase



RAS and Usability Improvement Highlights



- Logging capacity and performance: RBA/LRSN optionally expands to 10 bytes
- BIND / DDL / Online REORG concurrency with persistent threads
 - Avoid having to shut down apps to get a REBIND through, e.g. for application upgrades
- More online schema changes
 - Alter partitioning limit keys
 - DROP column
 - Point in time recovery support for deferred schema changes
- Autonomics improvements
 - Automatic index pseudo delete cleanup
 - Overflow row reduction
 - Optimizer externalizes missing stats to enable automated RUNSTATS
- Data sharing improvements
 - Group buffer pool write-around
 - Restart light enhancements
 - Index split performance and other indexing improvements
 - Full LRSN spin avoidance
- Plan management improvements - APREUSE(WARN) support
- -ACCESS DATABASE ... MODE(STATS) option to externalize RTS statistics

99.999% availability because
your business never stops.¹



Security Enhancements



- Remove inconsistencies between DB2 and RACF access controls
 - Automatic DB2 cache refresh when RACF changes are made
 - Package auth cache, dynamic statement cache, user authentication cache
 - Support BIND OWNER when using RACF exit
 - Support auto REBIND using owner's authid when using RACF exit
 - Dynamic SQL authorisation checking improvements
- Bind plan option to ensure the program is authorized to use the plan
 - New PROGAUTH bind option
- Remove column masking restrictions for GROUP BY and DISTINCT



Summary of Utilities Improvements

- Availability

- Online data repartitioning
 - REORG REBALANCE SHRLEVEL(CHANGE)
 - Online ALTER of limit keys
- Online REORG availability improvements
 - SWITCH phase reduction
 - Improved drain processing
- Part level inline image copies for REORG

- Usability

- Online REORG automated mapping tables
- REORG delete unused PBG datasets
- System cloning improvements

- CPU reduction

- More zIIP offload for LOAD and RUNSTATS

- Performance

- Faster LOAD processing
- Inline statistics improvements, reduced need for RUNSTATS
- Optimizer input to statistics collection
- REORG option to avoid sorting data for clustering
- DSNACCOX performance

Over 40 new enhancements!





Key utilities performance numbers



- Up to 81% zIIP-eligible CPU with RUNSTATS COLGROUP
- Up to 40% zIIP-eligible CPU in REORG & LOAD with inline distribution stats
- REORG SWITCH phase outage reduced by up to 91%
- Up to 71% elapsed time reduction for REORG of subset of partitions
 - SORTNPSI option retrofitted to V9 & V10
- RECOVER from part-level image copies reduced CPU by up to 50%, elapsed by up to 40%
- LOAD from single input dataset elapsed time reduced by up to 70%
- Crossloader support for FETCH CONTINUE for LOB & XML data
 - 28% CPU reduction



SWITCH phase impact relief

– reduced application impact



- Easier drain acquisition
- Prevent new claims on all target partitions whilst waiting for drains
 - Faster drain acquisition for part-level REORG
- New `DRAIN_ALLPARTS` option to momentarily drain all data parts
 - Eliminates claim-drain “deadlocks” for part-level REORG with NPSIs
- Restructure SWITCH phase processing for outage reduction
 - SWITCH phase ET reduction of 91% measured when reorging 20 parts
- New `SWITCHTIME` parameter to determine earliest point at which drain processing will be attempted
 - Govern timing of drain without the need to schedule separate `–ALTER UTILITY` command



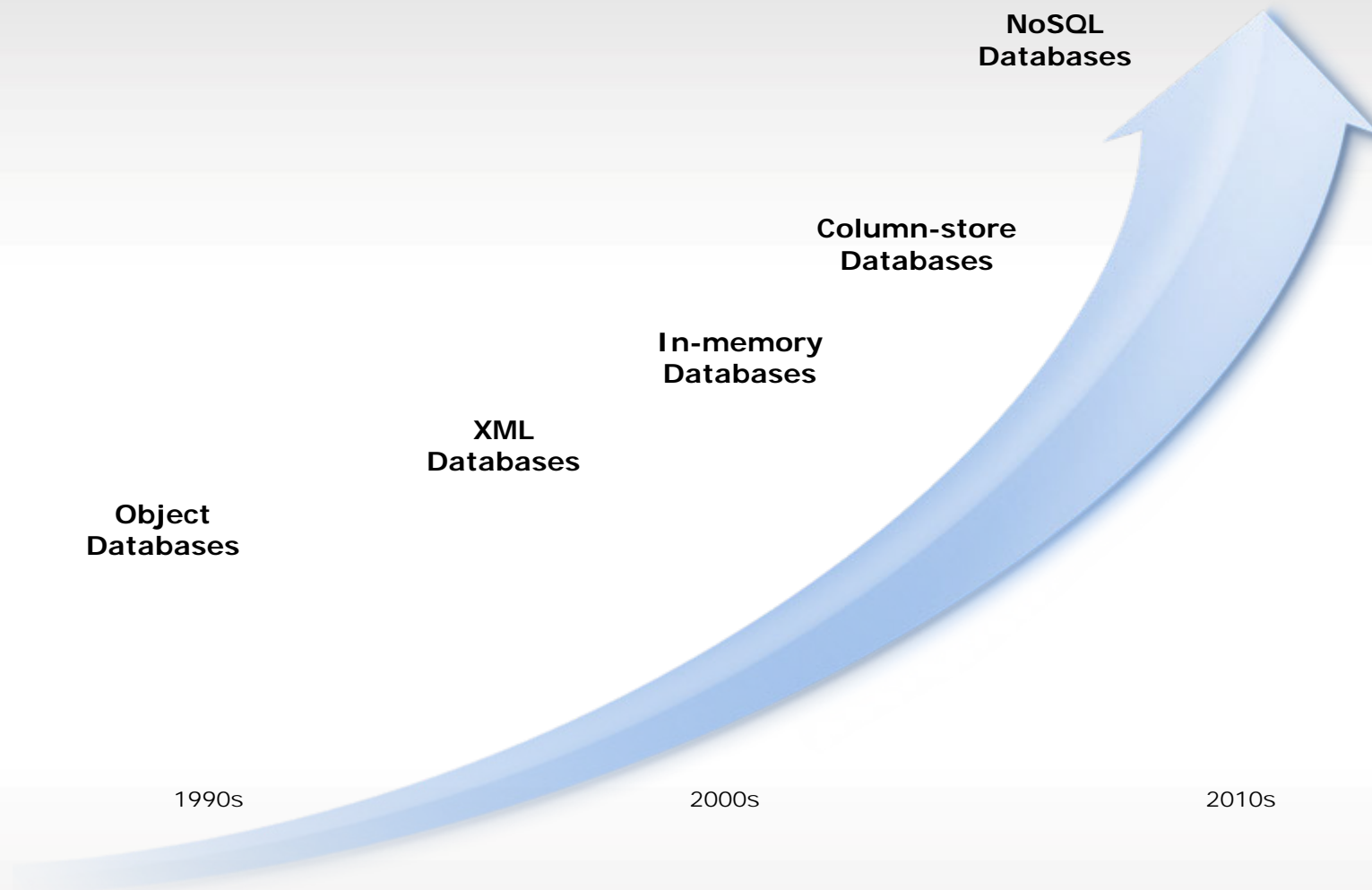
Expanded SQL and Analytics Capabilities



- Global variables
- SQLPL improvements: array data type, autonomous transactions
- Alias support for sequence objects
- Temporal data enhancements
 - Support for views
 - Special register support
 - Integrated auditing support (planned)
- Transparent archive query
- SQL Grouping Sets, including Rollup, Cube
- Unicode column support for EBCDIC tables
- Hadoop access via table UDF
- JSON support



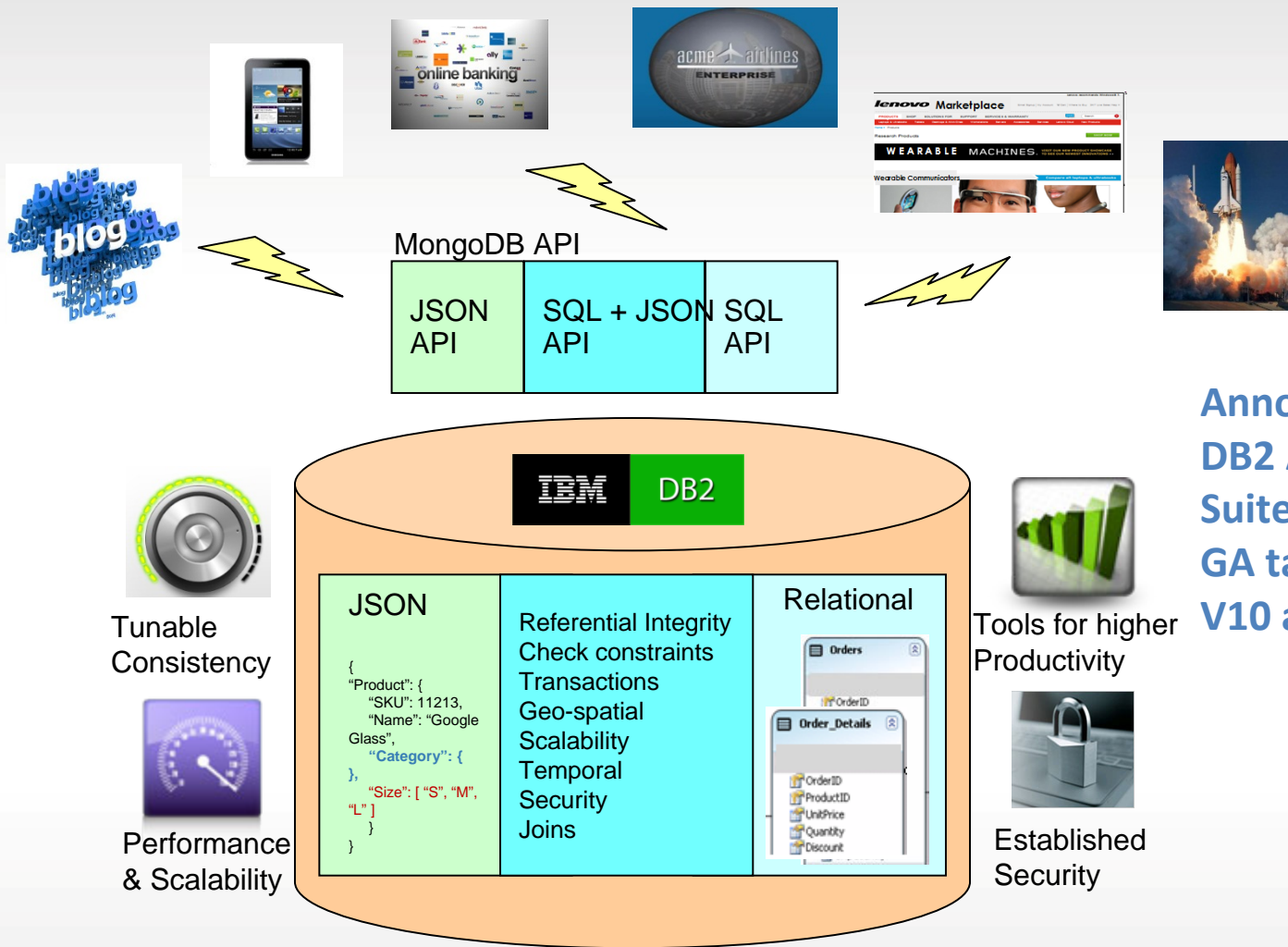
New Technology Emerges





JSON Database Technology Preview

Providing the best of both worlds



Announced in
DB2 Accessories
Suite for z/OS,
GA target Dec. 6
V10 and V11



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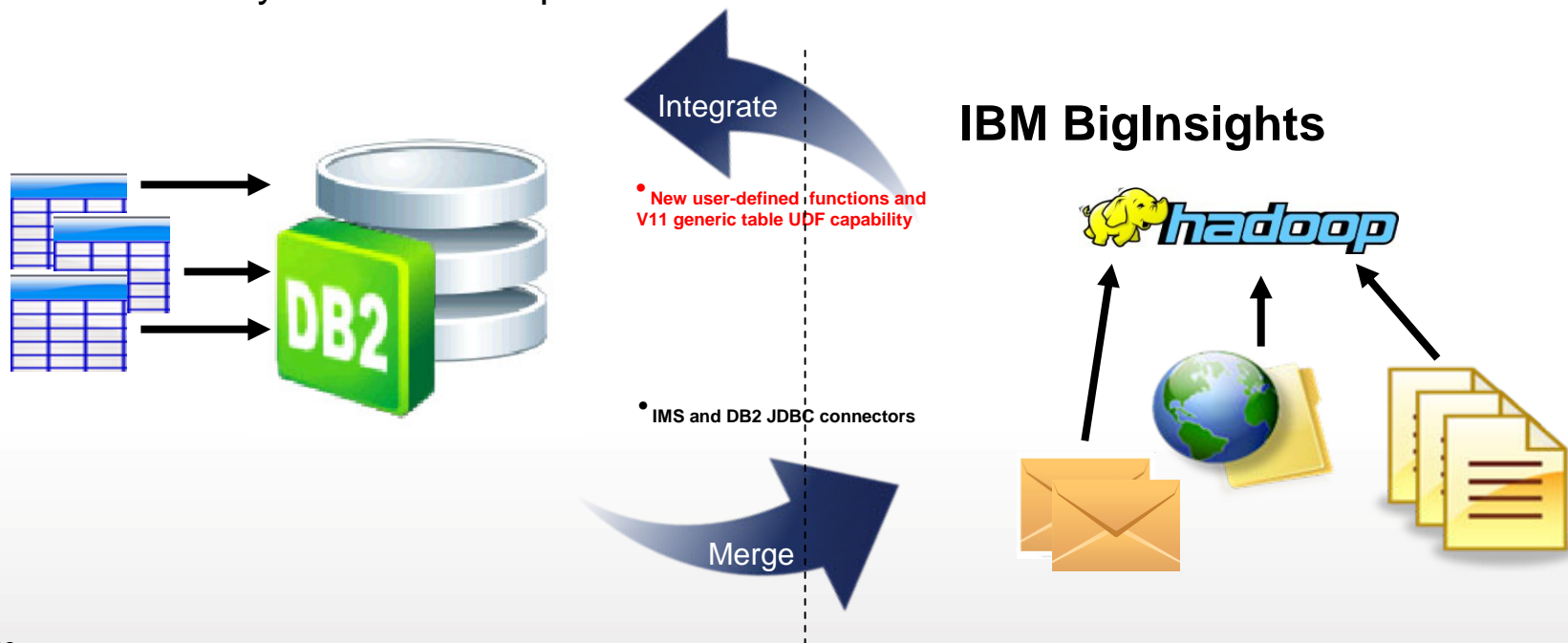


Integrating Big Data Analytics with DB2 for z/OS



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- Unstructured data sources are growing fast
- Two significant needs:
 1. Merge this data with trusted OLTP data from zEnterprise data sources
 2. **Integrate this data so that insights from Big Data sources can drive business actions**
- Connectors to allow BigInsights to easily & efficiently access DB2 data
- DB2 is providing the connectors & the DB capability to allow DB2 apps to easily and efficiently access hadoop data sources

New V11 features enable this





XML Enhancements



- New Features
 - Basic xQuery (retrofit to v10)
 - COBOL samples for XML (published on Developerworks website)
- Feature Enhancements
 - Implicitly add doc node during insert/update
 - Crossloader support
 - Fix error reporting position predicate
 - Support xquery constructor as the source expression of insert and replace
- Performance Enhancements
 - Binary XML validation (*retrofit to DB2 V10*)
 - Partial validation after update
 - Date/Time Predicate Pushdown
 - XQuery(FLWOR) and XMLQUERY enhancement
 - Optimize Index Search Keys
 - XML Operator Improvements, use less storage and CPU
 - XQuery deferred construction
 - XMLTABLE pushdown cast
 - Avoid validation of validated binary XML data during LOAD



Easier DB2 Version Upgrade



- Application Compatibility (APPLCOMPAT)
 - New feature to ease DB2 version upgrades – avoid impact to applications
 - New mechanism to identify applications affected by SQL changes in the new release
 - Seamless mechanism to make changes at an application (package) level or system level
- Faster ENFM processing
 - Lab measurement showed 18x faster in V11 vs. V10 using a large customer catalog
- Access path stability improvements
- Higher code quality stability levels
- SQL Capture/Replay tooling can help testing of DB2 version upgrades
- Migration Planning Workshops (MPW)
 - See the DB2 11 MPW community in DeveloperWorks for latest info

We have seen some really good results regarding CPU savings - we have been so impressed with the product stability and have already moved an internal production system to DB2 11”

Stefan Korte GAD



DB2 11 Optimized for SAP



- **Immediate SAP certification for DB2 11 at GA!**

- See SAP Note 1850403
- Easy migration from DB2 10:
 - No new SAP service packs required
 - Facilitated online DB2 migration

- **Save with CPU reductions**

- **Low latency connectivity from SAP app server**

- **Federated and consistent cloning of SAP business processes spanning multiple SAP/DB2 systems**

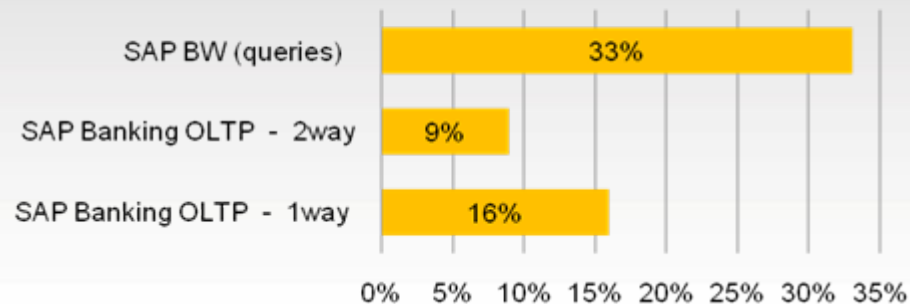
- **Online data maintenance**

- Better online REORG, online repartitioning

- **Better scaling**

- Larger log RBAs, larger statement cache

Sample CPU reductions from DB2 10



DB2 11 SAP Certified at GA - the fastest ever certification for any DB2 for z/OS release in history



DB2 11 ESP Highlights



ESP Start	February 2013
First Code Drop	March 2013
“Regular” service process	July 2013
GA	October 25, 2013

Core - 21 WW Customers

Geography

- 11 EMEA
- 9 NA
- 1 SA

Industry

- 7 Banking
- 5 Insurance
- 3 Healthcare
- 2 Financial Markets
- 1 Automotive

Extended – 6 WW Customers

Geography

- 3 EMEA
- 2 NA
- 1 SA

Industry

- 3 Banking
- 2 Computer Services
- 1 Professional Services



DB2 11 ESP Client Feedback



- Excellent quality and stability
- Good performance and CPU savings
 - ✓ DRDA workload up to 20% CPU reduction
 - ✓ CICS workload up to 18% CPU reduction
 - ✓ Batch workload up to 20% CPU reduction
- Full menu of functions, including
 - Utility improvements
 - Transparent archiving
 - Large RBA/LSRN
 - Optimizer and migration improvements
 - Big Data Integration
 - JSON Support for modern workloads

DB2 11 for z/OS - over 30 quotes

DB2 11 - SPEED & COST

"The Archive Transparency feature addresses an issue we have needed to resolve for a long time at the Bank and will reduce."

Paulo Sahadi, IT Executive Banco do Brasil

bankdata



"We have seen some really good results regarding CPU savings while running IMS-driven batch workload in our ESP test environment with DB2 11 CM/NFM - we have been so impressed with the **product stability** and have already moved an internal **production system to DB2 11**"

Stefan Korte GAD



DB2 11 Early Support Program (ESP)

CPU savings, very high quality, production level stability

“We have been involved in several DB2 for z/OS ESP’s. This one will rank as one of, if not the smoothest one yet.” – Large NA retailer

*“Overall they are very satisfied and astonished about the system stability of DB2 V11. In V10 they experienced this in another way.”
– European Insurance*

“We have seen very few problems in [Installation, Migration, and Performance]. Overall, it has been a very pleasant experience!!... The quality of the code is clearly much higher than for the ESP for DB2 10...” - European Banking/FSS

“Good code stability, no outages, no main failures, only a few PMRs....” – European Banking



DB2 11 Early Support Program (ESP)

CPU savings, very high quality, production level stability

“ Higher availability, performance, lower CPU consumption amongst other new features were the benefits perceived by Banco do Brazil with DB2 11 for z/OS. During our testing with DB2 11 we noticed improved performance, along with stability. ”

- Paulo Sahadi, IT Executive, Banco do Brasil

“We have seen some incredible performance results with DB2 11, a major reduction of CPU time, 3.5% before REBIND and nearly 5% after REBIND. This will significantly bring down our operating costs”

– Conrad Wolf, Golden Living

*“I saw a significant performance improvement in recovery of catalog and directory. (V10 5:53 minutes, V11 2:50 minutes) That rocks! ... **DB2 11 is the best version I have ever seen.**”*

- European Gov't

***“Overall, we have been impressed”** with the new version of DB2.”*

– NA Manufacturer



ESP Customer Experiences



- **Stadtwerke Bielefeld GmbH**

- Major business benefits: Performance and SAP feature exploitation. Expecting to move to DB2 11 as soon as SAP certification complete
- “The SAP IS-U unbilled revenue batch workload showed an elapsed time reduction of about 20% in Conversion Mode” -- Bernd Klawa, Stadtwerke Bielefeld DB2 DBA

- **JN Data**

- Major business benefits: Operational enhancements, extended log addressing, DBA productivity improvements
- “We love autonomics. DB2 11 has some really nice features for reducing the burden on the DBA” -- Frank Petersen, JN Data DB2 Systems Programmer

- **BMW Group**

- Major business benefits: Forthcoming zEC12 upgrade will allow use of 2GB page frames, ability to break into persistent threads and undertake more dynamic schema change will help business agility
- “Virtual storage isn’t a big limitation for us any more, but we expect the CPU savings in DB2 11 to provide the major business benefit for us” -- BMW Group DB2 for z/OS Product Manager



DB2 11 Planning



- Dual mode migration (CM, ENFM, NFM)
- DB2 10 is the platform for migration
- z/OS 1.13 or above. z10 or above.
- No pre-V9 bound packages
- DB2 Connect V10.5 FP2 is the recommended level for V11
 - This level is required to exploit most new V11 features
 - Any in-service level DB2 Connect supports V11
- Sysplex query parallelism support is removed
- DB2 11 Migration Planning Workshop (MPW)
 - Free, 1-day education
 - DB2 11 MPW Community on DeveloperWorks



DB2 11 Resources



- Information Center
- DB2 11 Technical Overview Redbook (SG24-8180)
 - Draft version available, final version coming soon.
- DB2 11 links: <https://www.ibm.com/software/data/db2/zos/family/db211/>
 - Link to DB2 11 Announcement Letter
 - Links to webcasts
 - Customer case studies
 - Whitepaper: “DB2 11 for z/OS: Unmatched Efficiency for Big Data and Analytics”
 - Whitepaper: “How DB2 11 for z/OS Can Help Reduce Total Cost of Ownership”
- DB2 11 Migration Planning Workshop
 - <http://ibm.co/IIJxw8>
- Free eBook available for download
 - <http://ibm.co/160vQgM>





DB2 Cypress Themes



- In-memory processing
 - HW/SW integration into the future on z
 - Out-of-the-box performance improvement
- “Mobile-scale” data bases
 - More schema flexibility
 - Extreme scale tables, indexes
 - Higher data ingest rates
- Cloud enablement
 - Developer self-service, cloud-based provisioning, deployment
 - Self-optimizing system
 - More transparent SQL optimization
 - Temporal catalog for powerful problem diagnosis capabilities
 - Easier management of large tables
- Analytics and Big Data
- Extend System z leadership for continuous availability



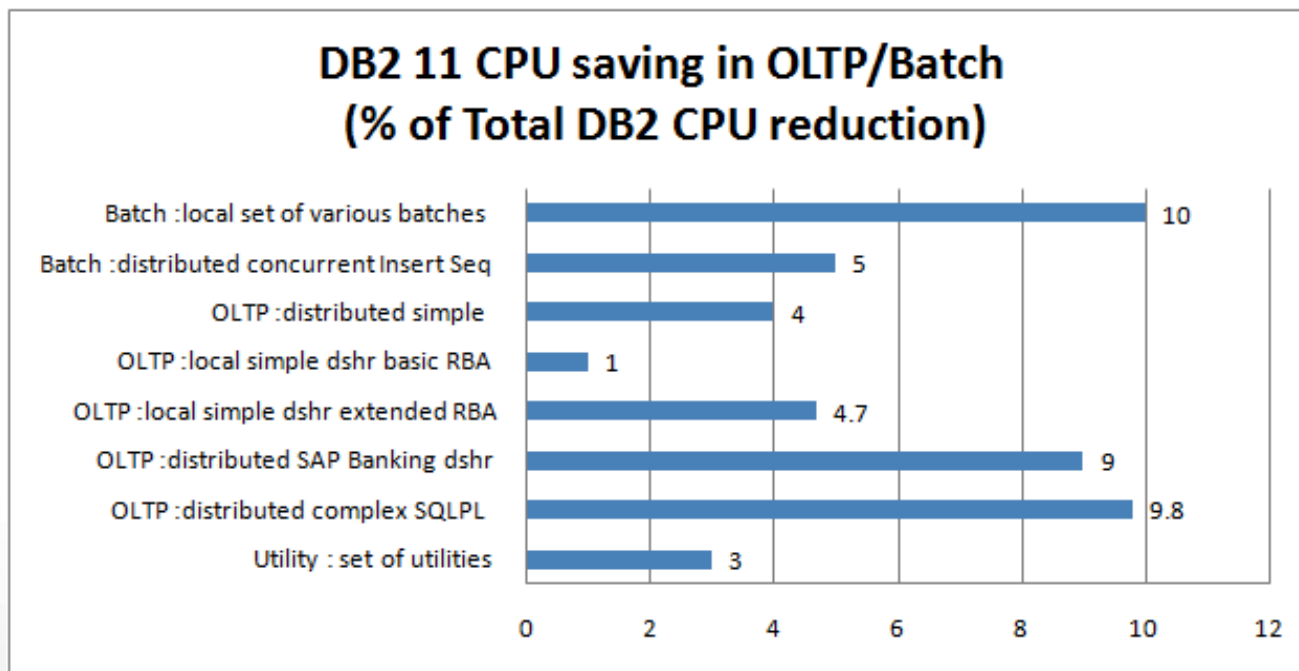


Thank You



DB2 11 OLTP/Batch Performance Expectations

- These are results from IBM testing
- Performance expectations vary depending on many factors, including
 - Access path selection, Read/Write ratio, Number of rows returned
 - Number and type of columns returned, Number of partitions touched
 - Schema - Number of partitions defined, DPSI, etc
 - RELEASE option, data compression

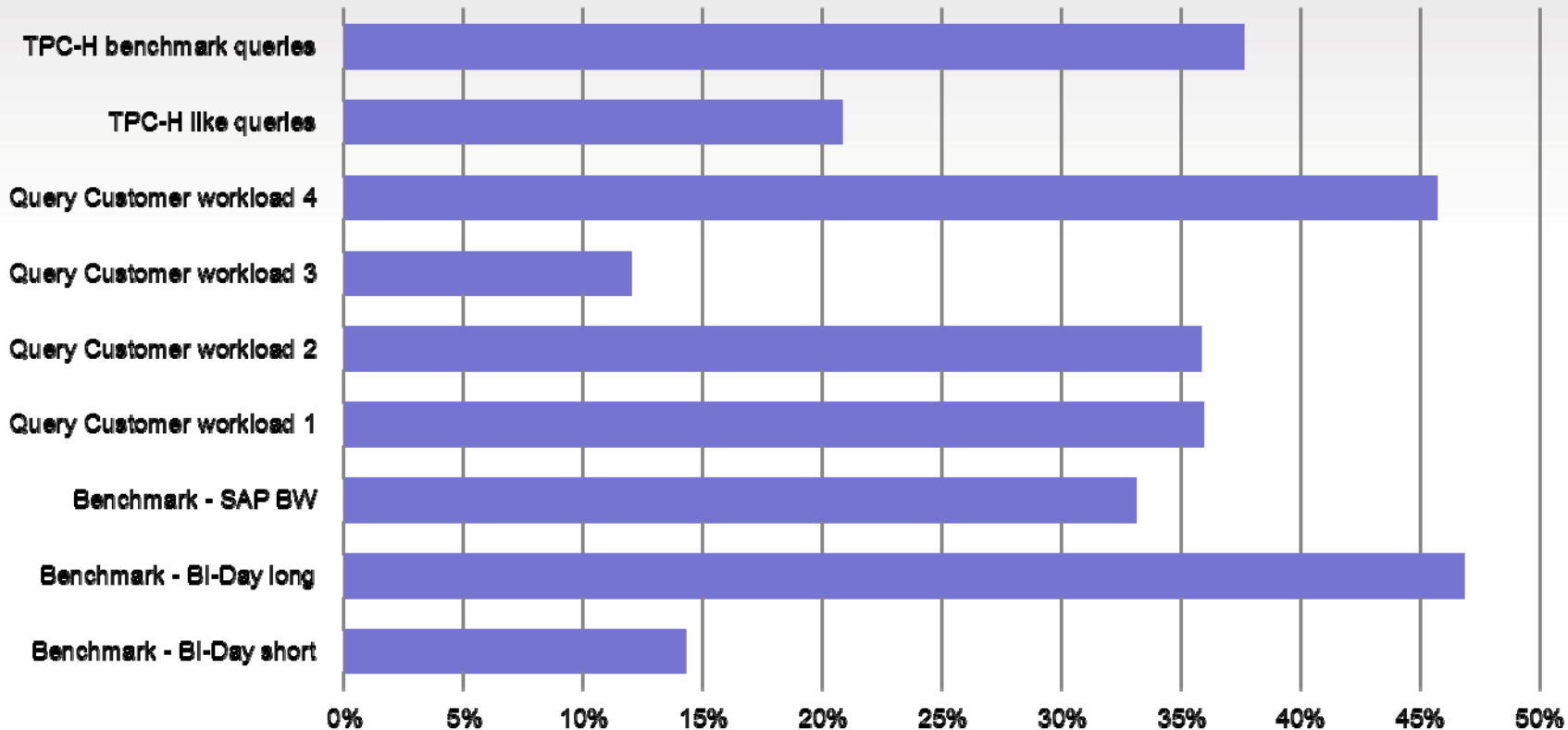




Significant CPU Reduction in Query Workloads



DB2 11 Query Workloads - **After REBIND w/o APREUSE** % of DB2 Class 2 CPU Reduction from DB2 10

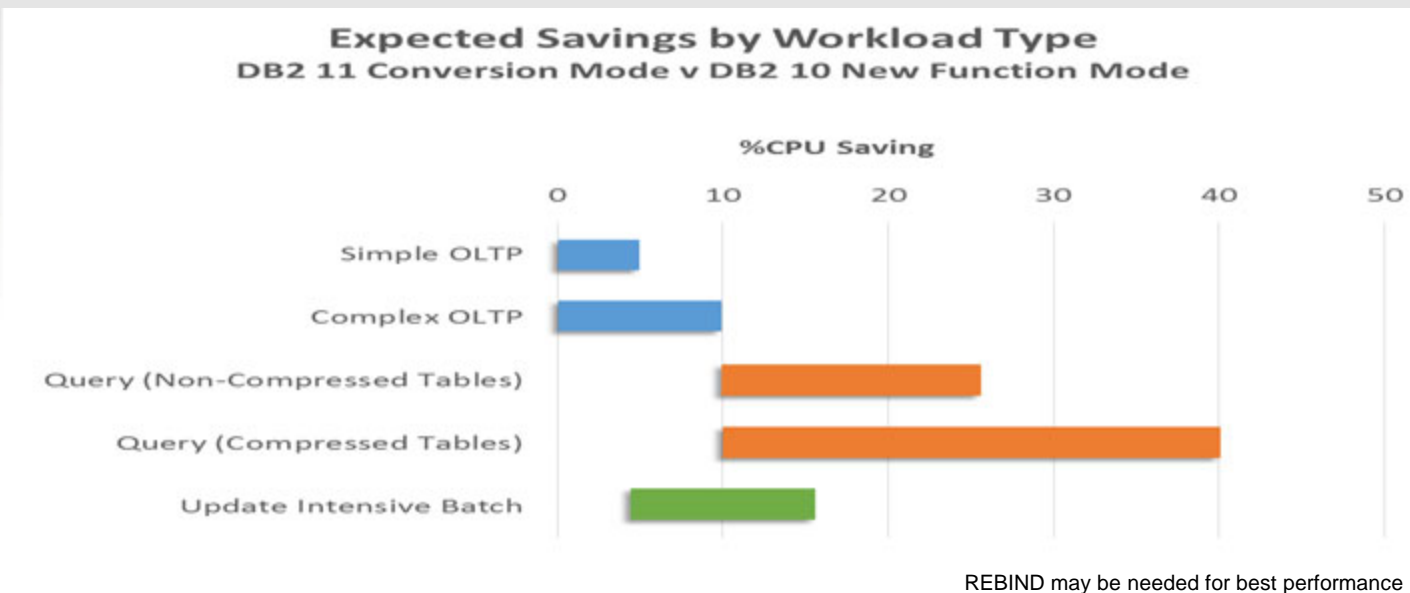


- Most performance improvements are also available with APREUSE
- New and improved access path choices may be available without APREUSE



DB2 11 Affordable for Every Type of Workload

- Out-of-the-box CPU Savings



- **DB2 base LOAD and REORG inline statistics collection** now executed under enclave SRBs, so are **now zIIP eligible**
- **More potential savings with application or system changes**
 - Log replication capture
 - Data sharing using extended log record format
 - Up to 20-90% CPU savings from pureXML performance enhancements

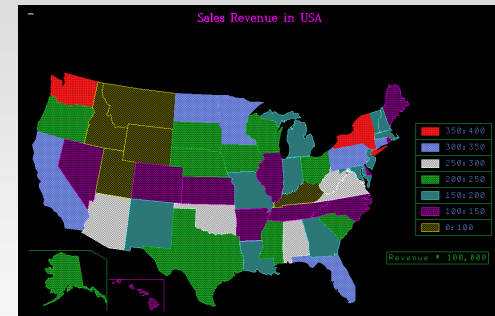


QMF 11: Business Analytics for the System z Enterprise



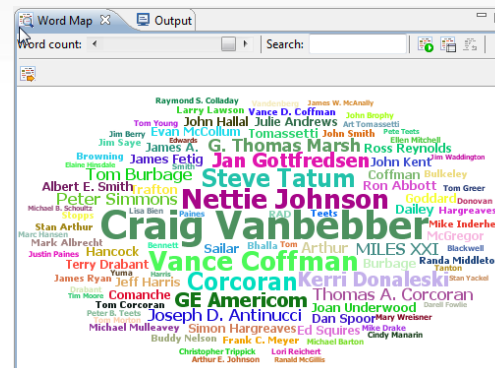
QMF Analytics for TSO

- Brand new component available in QMF Enterprise Edition 11
- Delivers unprecedented charting and statistical analysis capabilities directly to the mainframe
- Completely menu driven



Faster up and running with QMF reporting

- Adhoc Reports and Quick Reports
- Allows users to quickly and easily create their own sophisticated reporting objects using an open canvas



Analytics on unstructured data sources

- Text Analytics allows users to extract entities from unstructured data sources (either file-based or database-based) and display the results graphically



Increased support for the business user

- Dynamarts allow users to save their result sets with the objects for offline use
- Mobile device support for iPad and Android tablets





Appendix

- Original but now unused slides(s)



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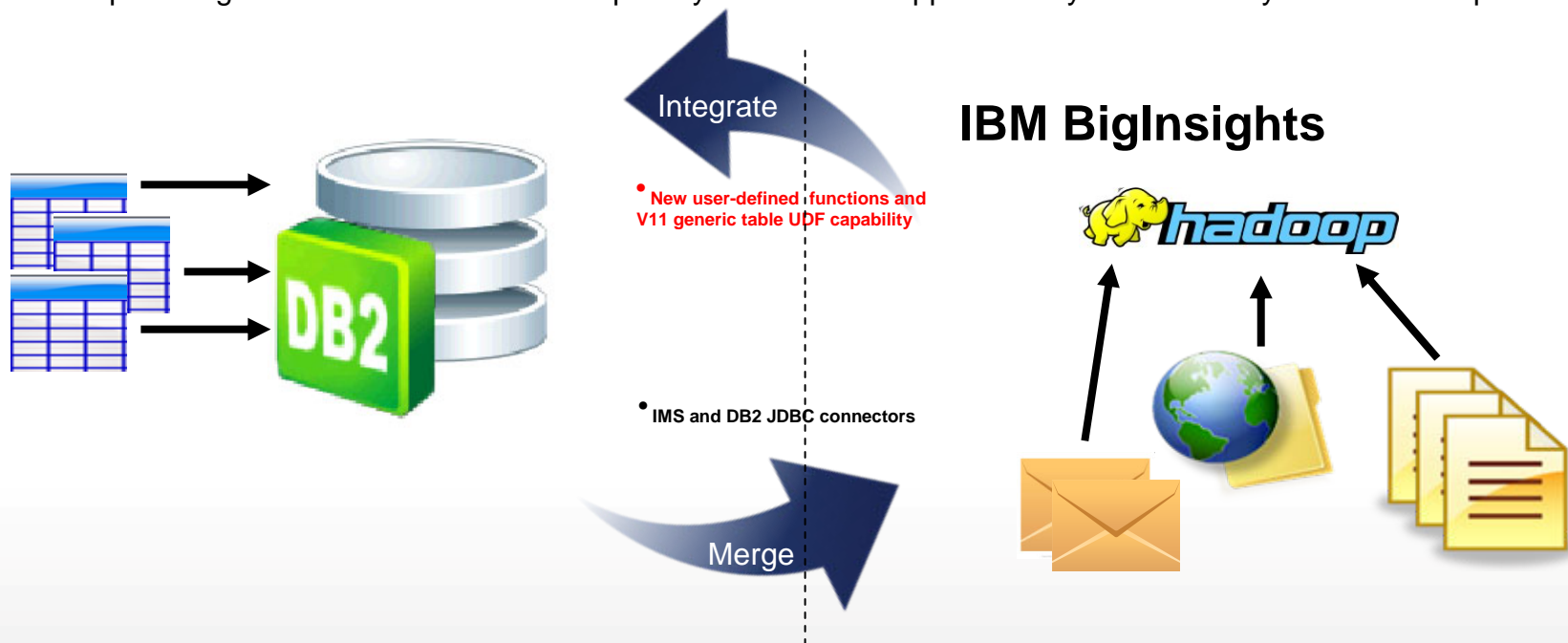
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