

# DB2 for z/OS: Utilities Update

## Session 1588

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**Information** On Demand **2011**

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# Information Management Communities



- **On-line communities, User Groups, Technical Forums, Blogs, Social networks, and more**
  - Find the community that interests you...
    - **World of DB2 for z/OS** <http://db2forzos.ning.com/>
    - **Information Management** [ibm.com/software/data/community](http://ibm.com/software/data/community)
    - **Business Analytics** [ibm.com/software/analytics/community](http://ibm.com/software/analytics/community)
    - **International DB2 User Group** [www.idug.org](http://www.idug.org)
- **IBM Champions**
  - Recognizing individuals who have made the most outstanding contributions to Information Management, Business Analytics, and Enterprise Content Management communities
    - [ibm.com/champion](http://ibm.com/champion)



# Useful DB2 for z/OS URLs



- **DB2 10 Launch Website**



<http://bit.ly/DB210Launch>

- **DB2 for z/OS Website**



<http://www-01.ibm.com/software/data/db2/zos/>

- **DB2 Product Library**



<http://www.ibm.com/software/data/db2/zos/library.html>

- **DB2 Newsletter**



<http://www.ibm.com/vrm/newsletter/11065>

- **Latest Whitepapers**

- Business Value of DB2 10 – Julian Stuhler
- A Matter of Time: Temporal Data Management
- Why DB2 for z/OS is BETTER than Oracle RAC ?

- **DB2 for z/OS e-Kit**



<http://bit.ly/DB210e-Kit>

- **Upcoming Conferences/Events**

- IDUG DB2 Tech Conference EMEA Prague - 13<sup>th</sup> -18<sup>th</sup> Nov 2011
- DB2 10 Migration Planning Workshop Prague - 13<sup>th</sup> November 2011
- IDUG DB2 Tech Conference AG Denver - 14<sup>th</sup> -16<sup>th</sup> May 2012
- IDUG 10 Migration Planning Workshop Denver - 13<sup>th</sup> May 2012




# Top DB2 for z/OS e-Communities




■ World of DB2 for z/OS - 1700+ members  <http://db2forzos.ning.com/>

■ DB2 10 LinkedIn - 1000+ members  <http://linkd.in/IBMDB210>

■ DB2 for z/OS What's On LinkedIn – 2000+ members <http://linkd.in/kd05LH>

■ DB2 for z/OS YouTube  <http://www.youtube.com/user/IBMDB2forzOS>





■ WW IDUG LinkedIn Group - 2000 +members <http://linkd.in/IDUGLinkedIn>

■ IBM DeveloperWorks  <http://www.ibm.com/developerworks/data/community/>

# DB2 10 is Here !

## Customers seeing reduced costs, simplified workloads through proven technology



Reduced Costs	Simplified Workloads	Proven Technology
<p>“Based on the performance metrics from our controlled test environment, we see a significant amount of CPU and Elapsed time savings. This release has many features that will help bring down our operating costs.”</p>  <p>Morgan Stanley DB2 Team</p>	<p>“With DB2 10 able to handle 5-10 times as many threads as the previous version, the upgrade will immediately give the bank some much-needed room for future workload growth while simultaneously reducing their data sharing overhead.”</p>  <p>Paulo Sahadi - Senior Production Manager, Information Management Division at Banco do Brasil</p>	<p>“Every single SQL statement we have tested has been better or the same as our current optimal paths – we have yet to see any significant access path regression. We had to spend a lot of time tuning SQL with DB2 9, but we expect that to disappear when we upgrade to DB2 10.”</p> <p>Philipp Nowak, BMW DB2 Product Manager</p>
<p>“We are particularly interested in the performance improvements due to the potential CPU reductions that we realized during our DB2 10 Beta testing. Our early testing has shown out-of-the-box processing cost reductions of between 5% - 10% and for some workloads as high as 30%. Potential cost savings of this magnitude cannot be ignored given today’s business climate.”</p>  <p>Large Global Bank</p>	<p>“The new temporal functionality in DB2 10 for z/OS will allow us to drastically simplify our date-related queries. In addition, we’ll be able to reduce our storage costs by using cheaper storage for inactive rows and reduce our processing cost by having DB2 handle data movement more efficiently than the custom code we’ve written to do the same work in the past”</p> <p>Large Insurance Company</p>	<p>The new audit capabilities in DB2 10 will allow tables to be audited as soon as they are created, which is an obvious benefit for the business and will reduce costs and simplify our processes”</p> <p>Guenter Schinkel -Postbank Systems AG</p> 

For more customer references visit : <http://www.ibm.com/software/data/db2/zos/testimonials.html>

# Agenda

- The Importance of IBM Utilities in DB2
- REORG
- LOAD & UNLOAD
- Backup & Recovery
- Other enhancements
- Summary



# The Importance of DB2 Utilities in DB2



- **DB2 Utilities Suite is critical for core function enablement in DB2**
- **DB2 Utilities Suite provides data & meta-data conversion capability**
- REORG/LOAD row format conversion in DB2 9
- REORG catalog/directory conversion during DB2 10 ENFM
- REORG non-disruptive meta-data changes in DB2 10
  - Pageset conversion, page size alteration, etc.
- REORG/LOAD inline LOBs in DB2 10
  - Including non-disruptive conversion of existing LOB data
- Utility support for hash pagesets in DB2 10
  - Including auto-estimation of required hash space in REORG
- Utility support for spatial indexes in DB2 10
  - Retrofit to DB2 9







# REORG news



# DB2 10 REORG



- **Avoidance & performance**
- Reduced need for REORG INDEX
  - List prefetch of index leaf pages based on non-leaf information for range scans
- Reduced need for REORG with compress on insert
- New REORGCLUSTERSENS RTS column
  - If no clustering-sensitive queries then avoid REORG to restore clustering
  - DSNACCOX and Automation Tool enhanced
- Improved performance for part-level REORG with NPIs & REORG INDEX
  - Index list prefetch results in up to 60% elapsed time reduction
- **Improved availability & removed restrictions - do things you could not do before**
- Reduced application outage for REORG with inline stats
  - Update catalog after dedrain
- REORG support for multiple part ranges
  - LISTDEF... PARTLEVEL(1:6,47,287:509)





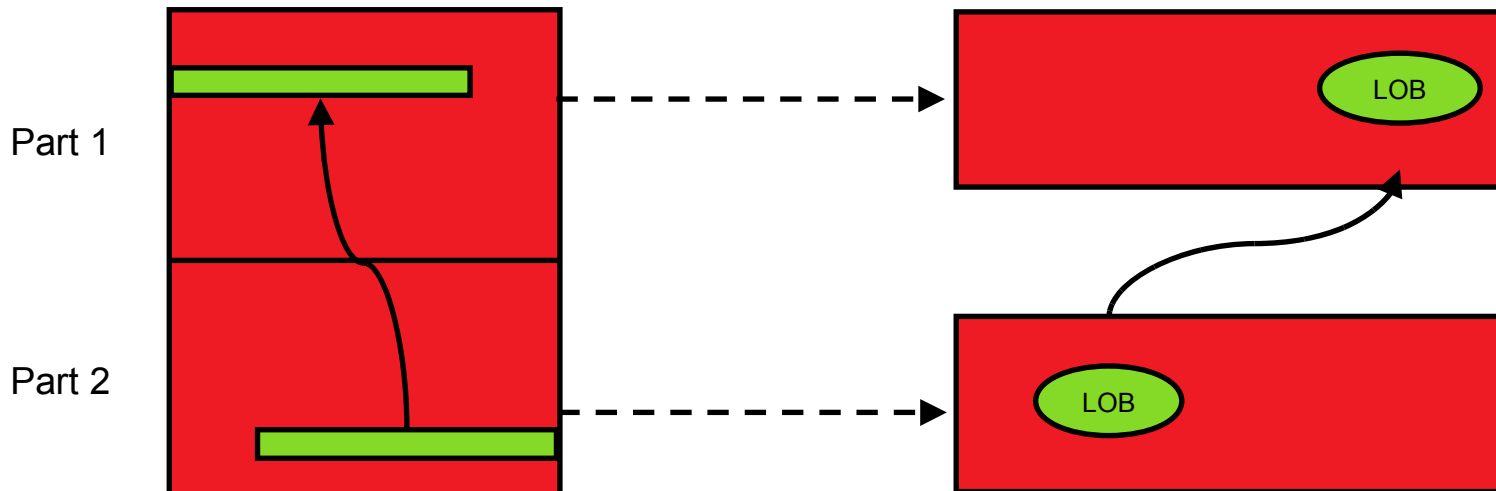
# DB2 10 REORG

- REORG SHRLEVEL CHANGE for all cat/dir page sets
- REORG SHRLEVEL REFERENCE|CHANGE to remove REORP
- REORG SHRLEVEL CHANGE for LOBs
  - Independent of whether LOBs are LOG NO or LOG YES
  - No mapping table required
  - Base table space must be LOGGED
  - REORG SHRLEVEL NONE for LOBs deprecated in V10 NFM
    - Will end rc0 but no REORG will be performed
- REORG FORCE option to cancel blocking threads
  - FORCE ALL or just READERS
  - Same process as –CANCEL THREAD so requires thread to be active in DB2 for it to be cancelled
  - Threads cancelled on final drain
    - Give well-behaved applications a chance to get out of the way



# DB2 10 REORG

- New AUX keyword on REORG of partitioned base for improved LOB handling
  - Permits rows to flow between partitions
  - Allows REORG REBALANCE with LOB columns
  - Allows ALTER of LIMITKEY with LOB columns
  - Permits move of rows between parts on PBG REORG
  - Permits deletion of corresponding LOBs on REORG DISCARD
  - Default is AUX NO unless LOB objects required to complete REORG
  - No XML column support for classic partitioned or PBR
  - No mapping table change required



# REORG APARs



- Retrofit of support of multiple part ranges
  - More efficient, improved availability, exploit parallelism
  - PK87762 & PM13259 (V9)
  - E.g. REORG PART 1,45:71,500:503,4010
  - Note: LISTDEF parts will now process in a single REORG
    - 2 implications to consider:
      - Might not have the disk space for sortwork or shadow pagesets
      - OFFPOSLIMIT/INDREFLIMIT apply to entire set of partitions
    - If cannot tolerate the above, then set new zparm to SERIAL
  - PM25525 (V9) – new PARALLEL keyword on REORG
  - PM37293 (V9) – new REORG\_LIST\_PROCESSING zparm to control PARALLEL REORG processing



# REORG APARs



- Online REORG materialisation of inline LOBs
  - PM29037 (V10)
- Faster REORG with no NPIs
  - PM37112 (V9)
  - Improve SYSLGRNX processing reduced SYSLGRNX GETPAGEs by up to 97%
- REORG CPU reduction
  - PM37630 (V9)
  - Up to 10% CPU reduction through sort efficiency/avoidance
- More zIIP offload for REORG
  - PM37622 (V9)
  - Up to 20% additional zIIP offload
- REORG to correct BRF/RRF mismatch after DSN1COPY
  - PM40646 (V9)





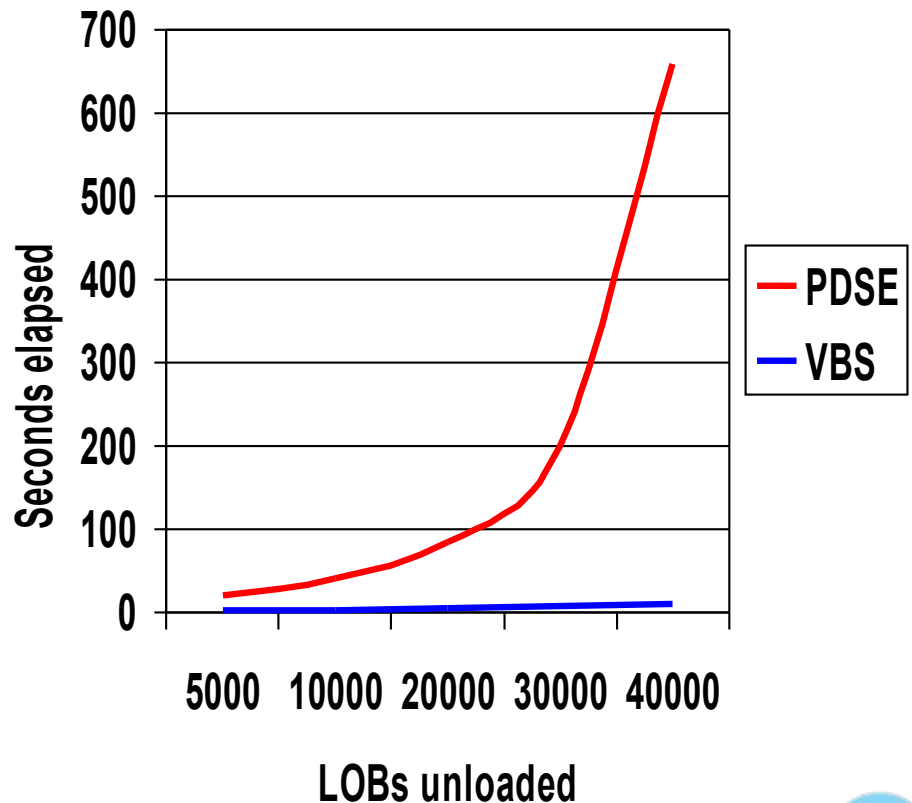
# LOAD & UNLOAD news



# DB2 10: LOAD & UNLOAD



- Remove MAX\_UTIL\_PARTS zparm
  - Restriction removed for REORG in V9
- Improved performance for LOAD REPLACE with LOB data
  - Up to 50% elapsed time reduction
- Spanned record support for LOB/XML data
  - LOBs & XML documents inlined in SYSREC with base data
  - Option in addition to FRVs
  - Performance & portability





# LOAD & UNLOAD APARs



- Faster handling of zero length LOBs in LOAD/UNLOAD
  - PM12286 (V9)
- Faster UNLOAD TABLESPACE
  - PM34858 (V9)
  - More efficient scan of SYSTABSTATS
  - Est. by one customer to reduce UNLOAD elapsed time from 44 mins to 55 secs



# LOAD & UNLOAD APARs



- LOAD/UNLOAD FORMAT INTERNAL
  - PM19584
  - Unload and load data in true internal format
  - 85% CPU & elapsed time reduction on UNLOAD
  - 77% elapsed time, 56% CPU reduction on LOAD
  - Supported by High Performance Unload
- LOAD PRESORTED
  - PM19584
  - Avoid sort overhead when data already sorted in clustering order
  - Up to 25% CPU reduction, 33% ET reduction depending on no. of indexes
  - Works well with Utility Enhancement Tool PRESORT option
- Fast LOAD through index avoidance
  - PM27962 (V9)
  - New INDEXDEFER option to skip index key insert
    - Leaves indexes or logical partitions in RBDP
  - For LOAD RESUME or partition-level LOAD REPLACE with NPIs
    - Can even skip unique indexes
  - LOAD single part (5% of data) with 5 NPIs: Save 64% ET





# Backup & Recovery News

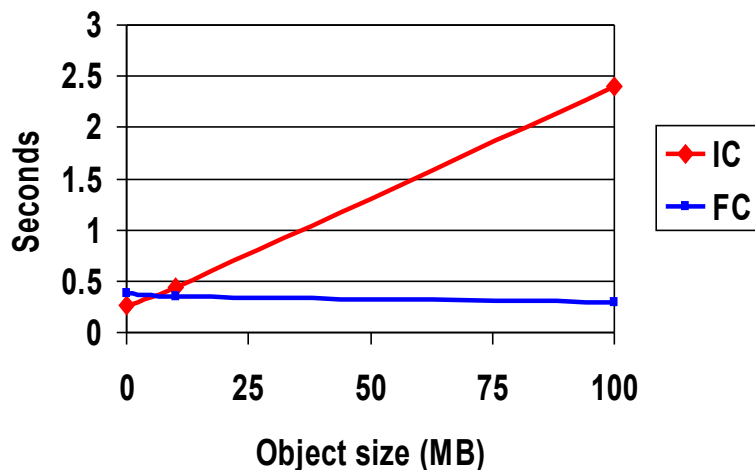


# DB2 10: Backup & Recovery

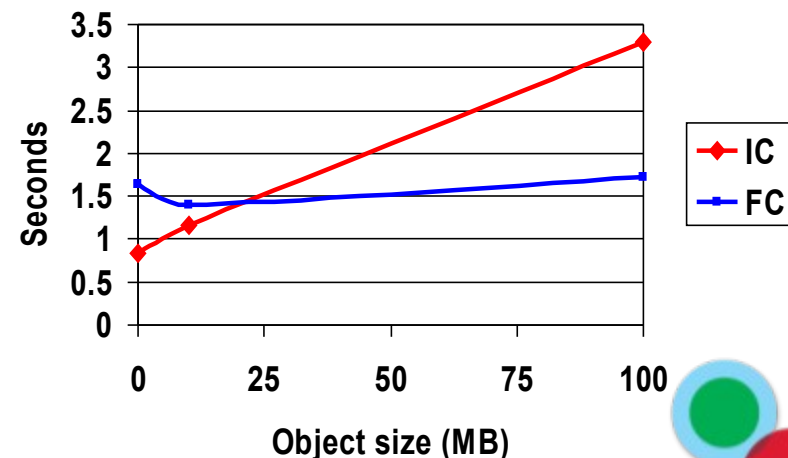


- Dataset-level Flashcopy support
  - COPY, RECOVER, REORG, LOAD, REBUILD INDEX, REORG INDEX
  - New zparms & utility parms to govern
  - Virtually eliminate CPU & elapsed time for large pagesets
  - Create transaction-consistent image copies from COPY SHRLEVEL CHANGE
  - Create partition-level inline image copies from REORG

CPU time per object (z10)



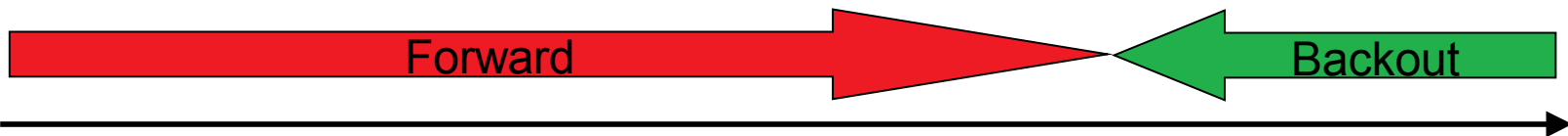
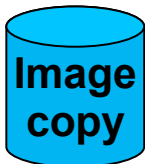
Elapsed time per object (z10)



# DB2 10: Backup & Recovery



- VERIFYSET option to fail PIT recovery if entire set not included
  - Base, LOB, XML & history objects
- ENFORCE NO option to avoid CHKP/ACHKP on PIT recovery of subset of set
  - Improved performance due to avoidance of set checking (RI, aux)
- Fast recovery to point in time through new BACKOUT option
  - Include indexes in RECOVER list to avoid the need to rebuild them
  - Indexes must be COPY YES
    - No imagecopy required though
  - LOBs requires APAR PM45650
  - PIT recovery always with consistency since V9



# Backup & Recovery APARs



- LOB pageset support for RECOVER BACKOUT YES
  - PM45650 (V10)
  - Lost LOBs will be marked invalid if necessary
  - Tablespace will be placed in AUXW
- Improved MODIFY RECOVERY support for SLBs
  - PM24237 (V9)
  - MODIFY will check for existence of SLB before setting copy-pending
  - REPORT RECOVERY support for SLBs delivered in base V10
- Faster image copy to tape
  - PM23786 (V9)
  - Improved tape mark handling when copying multiple pagesets to same tape
  - One customer measured 40% elapsed time improvement
- SELECT from SYSLGRNX
  - PM35190 & PM42331 (V10)
  - ISO(UR) enforced





# Other Utility News



# DB2 10: Statistics



- KEYCARD deprecated and is now the default
- RUNSTATS PROFILE support for simplification
- Autonomic features through new stored procedures & catalog tables
- All catalog statistics columns made updatable
- RUNSTATS SHRLEVEL REFERENCE updates RTS
  - TOTALROWS & TOTALENTRIES columns
- zIIP-enablement for RUNSTATS
- Auto sampling rates & page sampling instead of row sampling
  - Significant CPU & ET savings
  - TABLESAMPLE SYSTEM AUTO
- DSNACCOX enhancements
  - Support hashed pagesets
  - New RTS columns for SSD, other







- CHECK DATA
  - CHECK utilities will no longer set CHKP/ACHKP
  - CHECK DATA enhanced for XML support
    - Document validation
    - Schema validation
  - Automated exception table processing for XML documents
- Spatial index support for REORG, REBUILD INDEX & CHECK INDEX
- Removed UTSERIAL lock for greater utility concurrency
- LISTDEF support for DEFINED YES|NO|ALL
  - Improved utility performance since unnecessary to build & then discard structures for undefined objects
  - Default changed to DEFINED YES



# Other utility APARs



- Retrofit utility spatial index support to V9
  - PM35200 (V9)
- Prevent read-only outage from CHECK SHRLEVEL CHANGE utility when Flashcopy support not available
  - PM19034 (V9)
  - New CHECK\_FASTREPLICATION zparm
  - Recommend setting to REQUIRED
- Empty lists generated by LISTDEF changed to return RC4
  - PM27099 (V10)
  - Previously returned RC8
  - RC4 desirable, and necessary since default changed to DEFINED YES
- Improve DSN1COPY usability with REPAIR VERSIONS
  - PM27940 (V9)
  - For DSN1COPY of partitioned tablespaces



# Other utility APARs



- Allow utility restart when template uses &UNIQ or &UQ
  - PM19063 (V9)
- Extend DFSORT variable length record sort limit from 2bn to 4bn
  - PM43006 (V9)
  - 2bn limit affects single REORG data sort subtask
  - Prevent ICE121A FILE SIZE IS TOO LARGE error



# Summary



- Innovation continuing & delivery pace accelerating
- Day 1 GA utility support for core DB2 function
- Continuous delivery of performance enhancements & features of real value
- Eliminate application impact from utilities
- Reduce elapsed time & CPU consumption
- Reduce resource consumption
- Reduce complexity & improve automation





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