Utilities Update – DB2 10 Preview

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Agenda

- Recent DB2 9 enhancements
- Current DB2 9 work
- DB2 10 utility enhancements
- Summary

Delivery of enhancements in maintenance stream

- When prudent to do so
  - Risk vs. benefit
  - Resource
- Simplify utility processing
- Reduce resource consumption
- Improve performance
- Reduce CPU consumption

SORTNUM Elimination

- CHECK INDEX, REBUILD INDEX, REORG, RUNSTATS
- PK45916 (V8) & PK41899 (V9)
- Better performance, more robust, simpler
- SORTNUM no longer required
  - Difficult to estimate: failure if too low, excessive sort work allocation if too high
- New zparms UTSORTAL & IGNSORTN (online changeable)
  - UTSORTAL YES|NO
    - Use RTS data to estimate number of rows to sort
    - DB2 will dynamically allocate sort work datasets
      - If SORTWK DD cards not hard coded
  - IGNSORTN YES|NO
    - Override utility job setting of SORTNUM
- Recommendation
  - Turn on UTSORTAL, test it, then consider turning on IGNSORTN

DSNU3340I 168 08:13:52.66 DSNUGLSR - UTILITY PERFORMS DYNAMIC ALLOCATION OF SORT DISK SPACE

Other recent enhancements

- Permit use of ALIASes for LOAD, RUNSTATS and UNLOAD
  - PK77061 (V9)
- New DSNACCOX stored procedure to gather statistics from catalog and make utility recommendations
  - See PK44133
  - DSNACCOR still supported
- Better information for DPROPR/QRep or other IFI 306 readers
  - Write diag log record at utility termination so IFCID 306 readers can trigger refresh
  - PK78558 (V9)
- EAV dataset support
  - PK81151 (V8 & V9)
- Improved LOAD/UNLOAD processing with NUMRECS parameter
  - PK88970/PK88972/PK88974 (V9)
  - Replaces SORTKEYS at table space level with NUMRECS at table level
  - Simpler, eliminates risk of LOAD failure for load of multiple tables with skewed data distribution

Other recent enhancements

- LOAD/UNLOAD LOB file reference variable performance
  - PK75216 (V9)
  - PDS only, not HFS
  - 56% ET reduction on UNLOAD, 93% ET reduction on LOAD
- LOAD and UNLOAD to/from virtual file
  - USS named pipe support with templates
  - PK70269 (V8 & V9)
  - PK96023 (V8 & V9)
    - LBI on UNLOAD – 60% CPU reduction, 50% ET reduction
- LOAD COPYDICTIONARY
  - PK63324/PK63325 (V9)
  - REORG avoidance – prime empty partitions with compression dictionary

Performance – utility CPU consumption

- Focus on real CPU reduction & zIIP exploitation
- DB2 utilities have been zIIP-enabled since 2006
- Real CPU cost reduction in V9
  - 10-20% for COPY & RECOVER
  - 5-30% for LOAD, REORG, REBUILD INDEX
  - 20-60% for CHECK INDEX
  - 35% for LOAD partition
  - 30-40% for RUNSTATS INDEX
  - 40-50% for REORG INDEX
  - 70% for LOAD REPLACE partition with dummy input
- Flashcopy exploitation in DB2 10 dramatically reduces CPU consumption for COPY & reduces CPU for RECOVER & inline copies
- More zIIP offload in DB2 10 with RUNSTATS

Performance – zIIP exploitation for sort processing

- In spite of CPU reduction in V9, there is continued focus on CPU consumption for utilities
- Sort can consume ~60% of total utility CPU time
- DB2 in concert with DFSORT provides zIIP offload of DB2 utility memory-object fixed-length record sort processing
- Requirements:
  - DB2 APAR PK85889 (V8 or V9)
  - DFSORT APAR PK85856
  - z/OS 1.10
- PTFs can be applied independently of each other
- Exploitation is automatic

New solutions for DB2 9

- LOAD/UNLOAD FORMAT INTERNAL
  - Unload and load data in true internal format
  - Avoid field processing
  - 50% CPU reduction, 30% ET reduction measured for LOAD
- LOAD PRESORTED
  - Avoid sort overhead
  - Up to 25% CPU reduction, 33% ET reduction depending on no of indexes
  - Can combine with Utility Enhancement Tool PRESORT option
- Avoid FRVs for LOAD/UNLOAD of zero length LOBs
  - PM12286 (V9)
- Support REORG of multiple part ranges
  - PK87762 (V9)
  - E.g. REORG PART 1,45:71,500:503,4010
  - More efficient, improved availability, exploit parallelism

V10 REORG – improved availability & removed restrictions

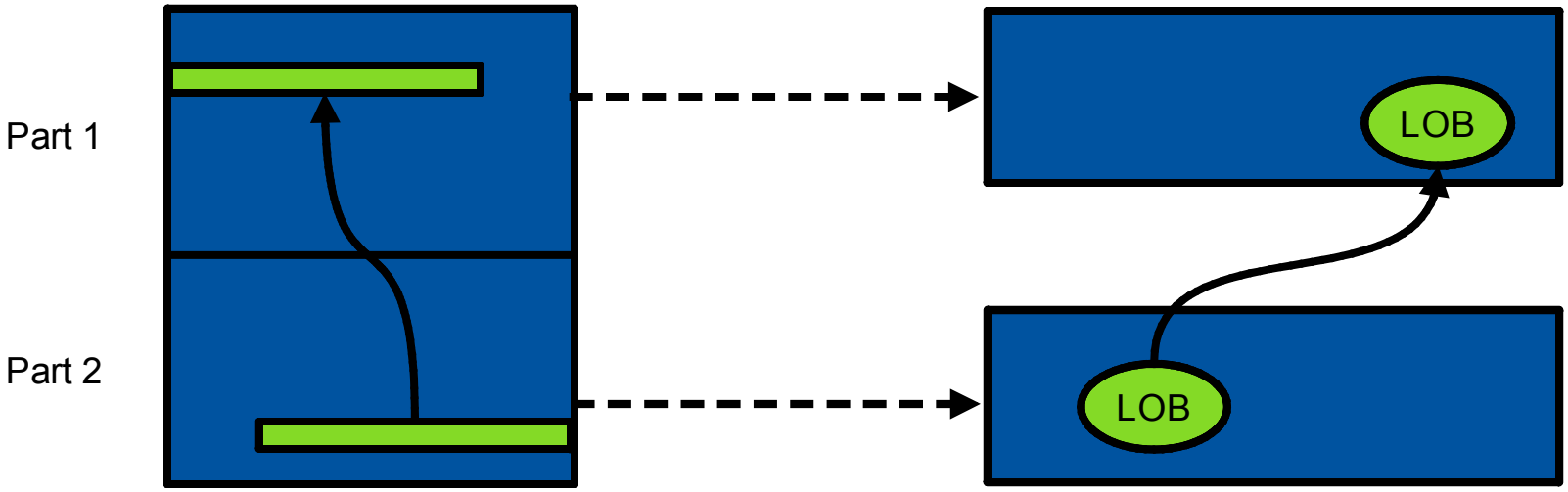
- Reduced need for REORG INDEX
  - List prefetch of index leaf pages based on non-leaf information for range scans
- Improved performance for part-level REORG with NPIs & REORG INDEX
  - Index list prefetch results in up to 60% elapsed time reduction
- Reduced need for REORG with compress on insert
- New REORGCLUSTERSENS RTS column
  - If no clustering-sensitive queries then avoid REORG to restore clustering
  - DSNACCOX enhanced
- REORG SHRLEVEL CHANGE for all cat/dir page sets
- REORG SHRLEVEL REFERENCE|CHANGE to remove REORP

V10 REORG – improved availability & removed restrictions

- 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 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
- Reduced application outage for REORG with inline stats
  - Update catalog after dedrain
- REORG support for multiple part ranges
  - REORG support retrofitted to V9 in PK87762
    - LISTDEF support is not retrofitted
- REORG support for hashed table spaces
  - New AUTOESTSPACE parameter to determine hash space

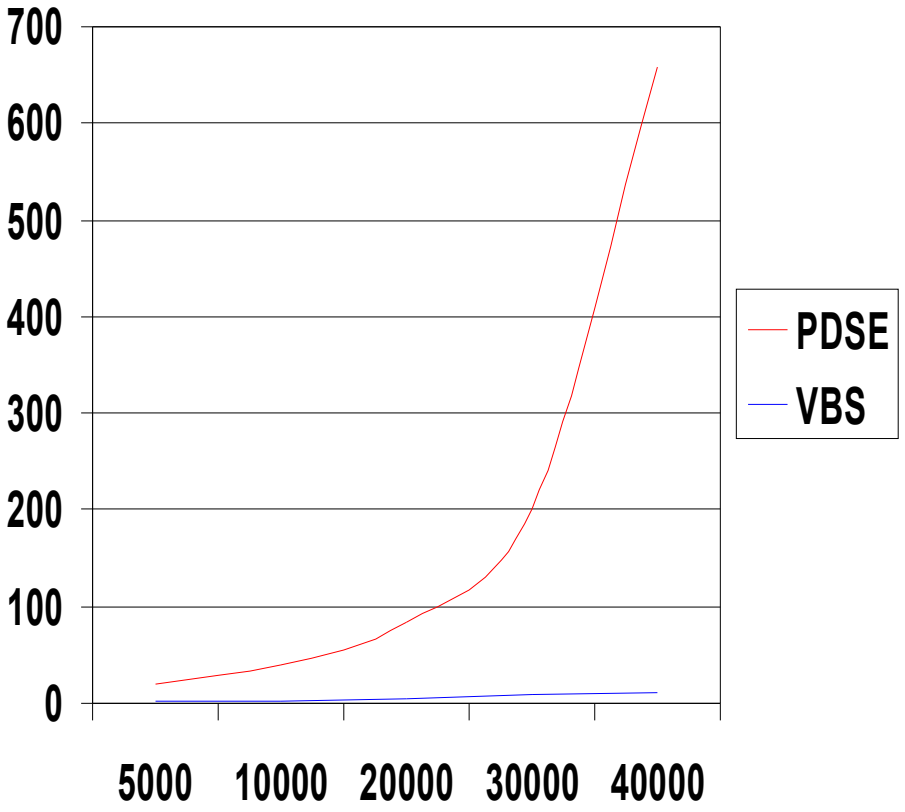
V10 REORG – improved availability & removed restrictions

- New AUX keyword on REORG of partitioned base for improved LOB handling
  - Permit 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



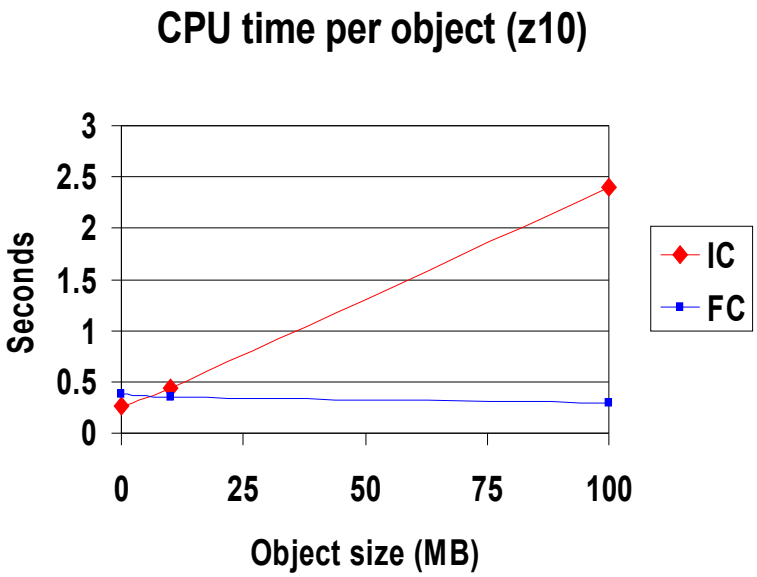
V10: LOAD/UNLOAD

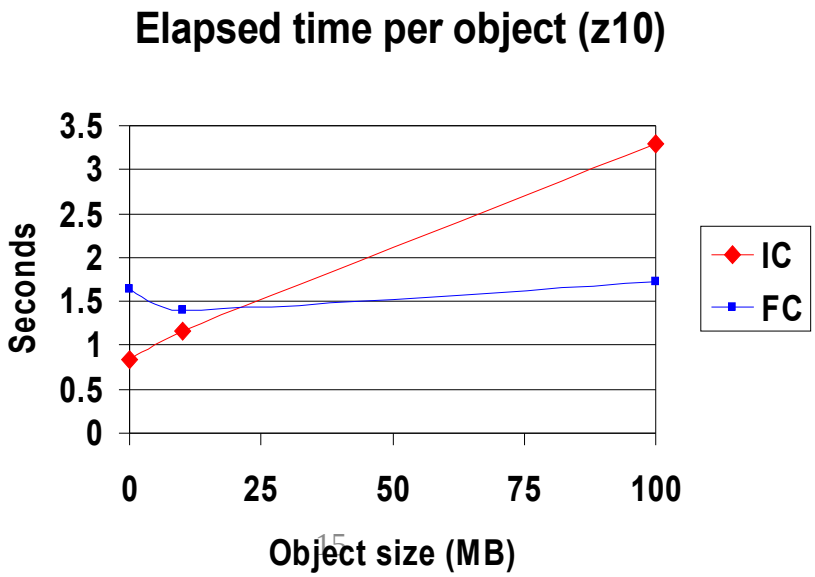
- Remove MAX_UTIL_PARTS zparm
  - Restriction removed for REORG in V9
- Improved performance for LOAD REPLACE with LOB data
  - Up to 50% elapsed time reduction
- Spanned record support for LOB/XML data
  - Option in addition to FRVs
  - Performance & portability



V10: COPY

- Dataset-level Flashcopy support
  - COPY, RECOVER, REORG, LOAD, REBUILD INDEX, REORG INDEX
  - New zparms & utility parms to govern
  - Significant CPU & elapsed time reduction
  - Create transaction-consistent imagecopies from SHRLEVEL CHANGE





V10: COPY

- Improved dataset management & performance
  - CHANGELIMIT will not allocate copy dataset unless copy taken
    - &ICTYPE now reflects actual image copy type
  - CHANGELIMIT to use RTS to determine full vs. incremental copy
  - Incremental copy will not allocate copy dataset unless pages changed
  - Insert dummy SYSCOPY record for incremental copy even though no pages changed
  - Delivery in maintenance stream post-GA

V10: RECOVER

- New BACKOUT YES option for point in time recovery
  - True rollback, not run of generated SQL undo statements
  - Requires COPY YES for indexes
- VERIFYSET option to fail PIT recovery if entire set not included
  - Base, LOB, XML, history – not RI
- ENFORCE option to avoid CHKP/ACHKP when subset of set recovered
  - Improved performance due to avoidance of set checking (RI, aux)

V10: Stats

- RUNSTATS PROFILE support for simplification
  - Includes ability to set profiles based on existing statistics
- RUNSTATS on views
- 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

V10: CHECK

- CHECK utilities will no longer set CHKP/ACHKP
- CHECK SHRLEVEL CHANGE default changed to fail if Flashcopy not available
- CHECK DATA enhanced for XML support
  - Document validation
  - Schema validation
- Automated exception table processing for XML documents

V10: Other

- Removed UTSERIAL lock for greater utility concurrency
- SQL SELECT on SYSLGRNX
  - Expect delivery post-GA
- LISTDEF & TEMPLATE enhancements
  - LISTDEF support for CHECK DATA
  - LISTDEF support for multiple part ranges on REORG
  - 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 & empty lists result in RC4
- REPORT RECOVERY support for SLBs
- DSNACCOX enhancements
  - Support hashed pagesets
  - New RTS columns for SSD, other

Summary

- This presentation does not cover utility support of core DB2 10 function that is available from day 1 of GA
  - Hashed tables
  - Materialisation of deferred alters
  - DEFINE NO for LOBs/XML
  - Etc.
- Continued delivery of performance improvements & features of real value
- Toleration, support & exploitation of new features from day 1
- Ensure utilities are non-disruptive
  - **Eliminate outages**
  - **Improve performance**
  - **Reduce resource cost**
- Reduce complexity & improve automation

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