DB2 11 Utilities Update

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Session code: A4
Monday 10 November 2014 | Platform: z/OS
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Agenda

- Strategy
- Overview
- REORG
- Statistics
- Backup & Recovery
- UNLOAD & LOAD
- Compression Dictionaries
- General Enhancements
- Deprecation
- Recent News
- Questions & Feedback
Strategy

• Support core function
• Reduce CPU, ET & resource consumption
• Maximize availability
• Remove constraints & limitations
• Simplify data management
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
Timing of SWITCH phase with MAXRO DEFER

- Govern timing of drain and switch for long-running REORGs without the need to schedule separate `ALTER UTILITY` command
- New SWITCHTIME parameter to determine earliest point at which drain processing will be attempted
Delete empty PBG partitions

• Ability for REORG to physically delete empty PBG partitions

• New zparm REORG_DROP_PBG_PARTS
  • DISABLE – keep V10 behaviour (default)
  • ENABLE – Delete empty PBG partitions on table space-level REORG

• Considerations:
  • Cannot be specified on REORG statement
  • If PBG created using NUMPARTS or ALTER ADD partition used, REORG may prune to a lesser number of partitions
  • No PIT recovery to prior to a pruning REORG
  • No facility to resurrect deleted partitions
Auto mapping tables

- Support mapping tables in PBG
  - Increases mapping index limit from 64Gb to 16Tb
  - Retrofitted to V9 in PM58177
- Mapping table DDL must change in 11 due to RBA/LRSN change
- Requirements to automate mapping tables
- So... New automated mapping tables in REORG
  - Automatically create new format mapping table if required
    - If mapping table specified & correct format then honour specification
    - Else if specified but incorrect format then create new in same db as original
    - Else if not specified and zparm DB specified then create in zparm DB
    - Else create in implicitly created DB
  - DROP at end of REORG or end of last REORG if multiple REORGs in job step
  - NFM requires new format mapping table, CM supports both old and new
  - No additional auth requirements necessary for creation of mapping tables
SORTDATA NO improvements

- Increasingly REORGs are performed for reasons other than to regain clustering of data, yet no ability to avoid cost of reclustering.
- Prior to DB2 11, REORG SHRLEVEL CHANGE did not support SORTDATA NO.
- DB2 11 supports SORTDATA NO with SHRLEVEL CHANGE.
- New RECLUSTER YES/NO option on SORTDATA NO:
  - RECLUSTER NO – Do not unload data through clustering index and do not sort data records in clustering order.
Part-level inline image copies

- Faster partition-level recovery from inline image copy
- Create partition-level inline image copies if using TEMPLATE with &PA or &PART
  - No new option or keyword on REORG
  - PM93611:
    - Support substring notation with &PA as long as substring ensures uniqueness
    - Support writing to tape as long as STACK YES not specified
Improved REORG LISTDEF processing

- PARALLEL YES/NO option introduced in APAR in V9
  - NO – Prevent REORG from processing multiple partitions in single REORG when input is partlevel LISTDEF
  - Zparm REORG_LIST_PROCESSING at zparm level
- Need compromise option for customers who want to take advantage of REORG parallelism but cannot afford to shadow many partitions at a time
- New option LISTPARTS n to limit # of partitions to be processed in a single REORG if input is a part-level LISTDEF
- In DB2 11, PARALLEL YES/NO is superseded by LISTPARTS
  - PARALLEL YES/NO IS deprecated but still supported in 11
REBALANCE enhancements

- Improved availability & failure prevention
- Support REORG SHRLEVEL CHANGE REBALANCE
  - Complements online ALTER of partition limit keys
- Improve resiliency with enhanced distribution algorithm & improved handling of empty partitions
- Build compression dictionary for all partitions
  - Previously, partitions that were empty at the start of REORG would not have a dictionary built, requiring a subsequent REORG to gain compression
- New SORTCLUSTER option to sort data in clustering as well as partitioning order to avoid AREO*
  - Occurred when partitioning key not a superset of clustering key
  - SORTCLUSTER YES – sort in partitioning and clustering order, avoid AREO*
  - No specification – keep existing behaviour, set AREO*
  - SORTCLUSTER NO – keep existing behaviour, but do not set AREO*
REORG of LOB data

- Support REORG of LOB data even though aux index is unavailable
  - Problem in V10 if LOB tablespace is REORP and index is RBDP
    - LOBs can’t be reorged and index can’t be rebuilt
- REORG SHRLEVEL NONE for LOBs changed to RC8 from 11 CM onwards
  - Not supported in 10 NFM, but returns RC0 with MSGDSNU126I
REORG – change defaults to match best practices

- Change default options:
  - DRAIN WRITERS to DRAIN ALL
  - DISCARD to DISCARD NOPAD YES
  - UNLOAD EXTERNAL to UNLOAD EXTERNAL NOPAD YES
Statistics enhancements

- More zIIP offload for RUNSTATS distribution statistics
  - Up to 80% zIIP-eligible
- zIIP offload for inline statistics
  - Additional 30% offload to zIIP
- Enhance inline statistics for RUNSTATS avoidance
  - Inline statistics collection on NPSIs during REORG with SORTNPSI
  - Inline histogram statistics
  - Inline DSTATS
- New RUNSTATS RESET option to reset existing statistics
- Improved PROFILE usability for LISTDEF processing
  - Gather default statistics if no profile exists for table
Statistics enhancements

- Optimizer determination of missing statistics
  - Optimizer identifies missing statistics & writes information to new catalog table DSN_STAT_FEEDBACK
  - OQWT modifies statistics profile
  - Automation Tool detects profile change & builds RUNSTATS job
  - DSNACCOX similarly enhanced to recommend RUNSTATS

- ACCESS DATABASE ... MODE(STATS) option to externalize RTS statistics

- RTS overhead reduction
Backup & Recovery Enhancements

- Faster catalog/directory recovery
  - Enhanced SYSLGRNX recording
- New VCAT name translation for RESTORE SYSTEM for system cloning
  - Support logapply when RESTORE SYSTEM used for cloning purposes
- Improved recoverability with COPY-REORG concurrency
  - Permit COPY to run concurrent with long-running REORGs
- Avoid allocating empty image copy datasets for incremental or CHANGELIMIT copies
Backup & Recovery Enhancements

- Lifted many restrictions on point-in-time recovery prior to materializing REORG
  - PIT recovery restrictions lifted for
    - LOB table spaces
    - XML table spaces
    - PBR table spaces
    - Including when immediate alters have occurred since materializing REORG
  - PIT recovery restrictions still in place
    - Table space conversion
    - PBG table spaces
    - PBG partition pruning
    - Online DROP COLUMN
- Faster index recovery with FLA support for index log records
  - APAR PI07694 for V9 and above
LOAD & UNLOAD

• Crossloader support for XML data
• Exploit FETCH CONTINUE for processing large LOBs & XML data in Crossloader
  • Reduce vstor requirement
  • Avoid DSNU1178i errors
  • 28% CPU reduction
    • Load of 1Mb LOBs
• zIIP offload for LOAD REPLACE PART clearing of NPSIs
  • 100% offload to zIIP for LOAD REPLACE with dummy input
LOAD & UNLOAD

- LOAD SHRLEVEL NONE PARALLEL with single input dataset
  - Parallel data conversion
  - Not supported for PBGs
  - 50% ET reduction possible on single SYSREC load
LOAD & UNLOAD

- LOAD SHRLEVEL CHANGE PARALLEL
  - Supports non-partitioned as well as partitioned
  - Single input dataset
  - Not supported for PBGs
  - >80% ET reduction

Diagram:
- Input SYSREC
  - Read task
  - Conversion 1
  - Conversion 2
  - Conversion 3
  - Conversion 4
  - Part 1
  - Part 2
Compression dictionaries

- Avoid decompression failures for IFI 306 readers when new compression dictionary built by REORG/LOAD
- Old compression dictionary stored on log
- New SYSCOPY record written pointing to old compression dictionary for CDC tables
- IFI 306 read automatically retrieves old compression dictionary if necessary
- Avoid need for replication target refresh when dictionary changes
General

• Greater parallelism for faster utilities
  • 11% elapsed time reduction measured for REORG, LOAD, REBUILD INDEX

• PARALLEL option for parallelism control for LOAD, REORG, REBUILD INDEX, UNLOAD, CHECK INDEX

• -DISPLAY UTILITY enhancements
  • Remove serialization between –DIS UTIL and –TERM UTIL
  • Jobname, start timestamp
  • Late addition: SWITCHTIME and NEWMAXRO

• Utility impact reduction on bufferpools
  • Extend MRU for UNLOAD, REORG TABLESPACE, RUNSTATS TABLESPACE, RUNSTATS INDEX, REBUILD INDEX, CHECK INDEX, CHECK DATA

• Improved dataset cleanup in utility stored procedures
  • Previously, datasets remained allocated on utility failure, preventing cleanup
General

- Improved TEMPLATE support for large / EF datasets and local time values
  - DSNTYPE LARGE, EXTREQ, EXTPREF
  - New EATTR option on TEMPLATE to request extended attributes
  - New TIME LOCAL|UTC option
- Enforce NUMTCB=1 for stored procedures
- DSNACCOX performance
Deprecation

• REORG SHRLEVEL NONE for LOBs changed to RC8 from 11 CM onwards
  • Not supported in 10 NFM, but returns RC0 with MSGDSNU126I
• Still supported in 11, but no longer documented:
  • REORG
    • PARALLEL YES|NO
      • Superseded by LISTPARTS
    • INDERFLIMIT
    • OFFPOSLIMIT
    • LEAFDISTLIMIT
    • UNLOAD ONLY
    • UNLOAD PAUSE
    • UNLOAD EXTERNAL
  • COPY
    • CHANGELIMIT
Recent news

- Part-level REORG NPSI insert performance improvement
  - PM87403 (V9)
  - 100m row table, 6 indexes
  - LOAD RESUME – 66% CPU reduction, 30% ET reduction
  - REORG PART 9 – 45% CPU reduction, 26% ET reduction

- Fast log apply for faster index recovery
  - PI07694 (V9)

- Retrofit REORG SWITCH phase performance to V10
  - PI09303 (V10)
  - Cut SWITCH phase duration by 90%

- Retrofit REORG REBALANCE SHRLEVEL CHANGE to V10
  - PI11839 (V10)

- LOAD REPLACE SHRLEVEL REFERENCE, LOAD RESUME SHRLEVEL REFERENCE, LOAD prevalidation
  - Delivered in Utilities Enhancement Tool / Utilities Solution Pack
  - PI04864
Unparalleled investment in utilities

IBM Utilities Suite is essential for exploitation of major DB2 enhancements

Support of core DB2 function from day 1 of GA

Expect continued delivery of enhancements on release boundary, and in maintenance stream when prudent

Continued focus on:

- Elimination of application impact from utilities
- Elapsed time & CPU consumption reduction
- Resource consumption reduction
- Reduction in complexity & automation improvements
- Solutions through DB2, Utilities & Tools
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Session A4
Title: DB2 11 Utilities Update

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