

DB2 11 Utilities Update

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Agenda

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

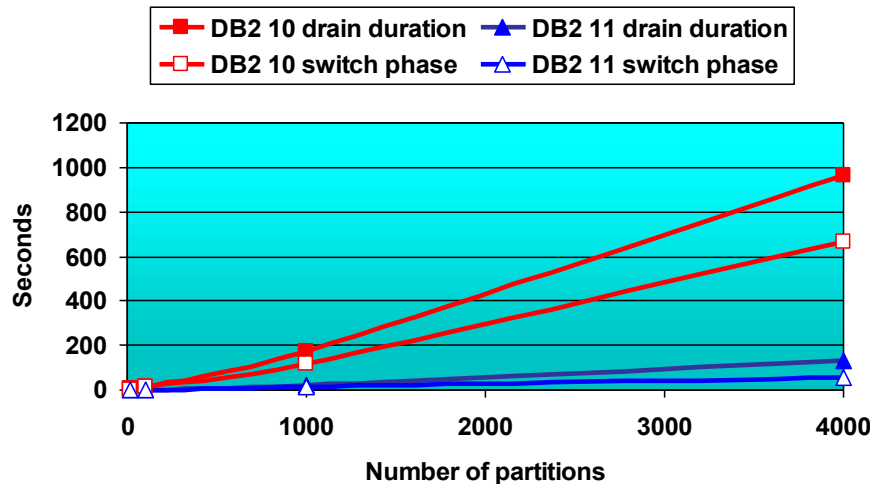
Strategy

- 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

**REORG drain duration
and switch time**



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

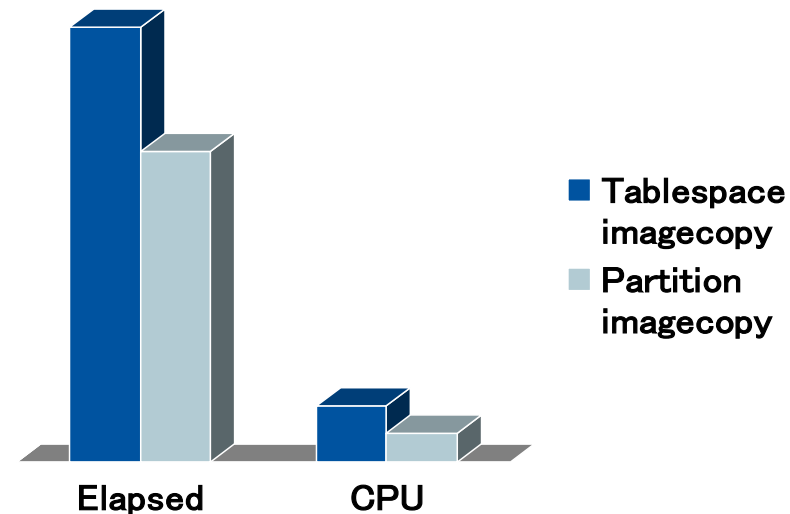
- Support mapping tables in PBG
 - Increases mapping index limit from 64Gb to 16Tb
 - Retrofitted to V9 in PM58177
- Mapping table DDL must change in 11 due to RBA/LRSN change
- Requirements to automate mapping tables
- So... New automated mapping tables in REORG
 - Automatically create new format mapping 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 recluster
- 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

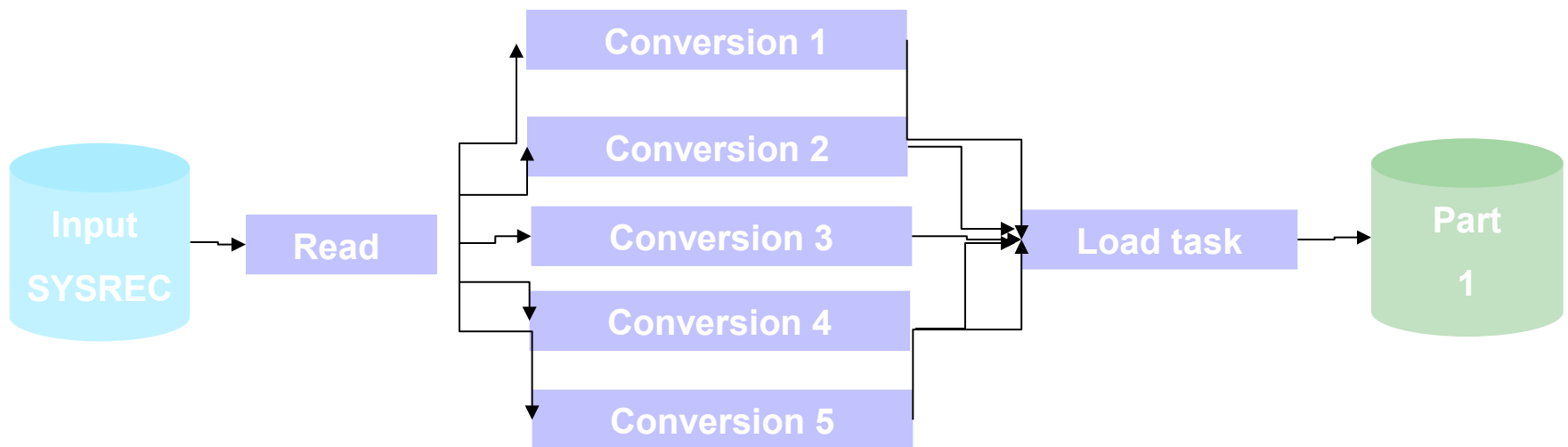
LOAD & UNLOAD

- 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

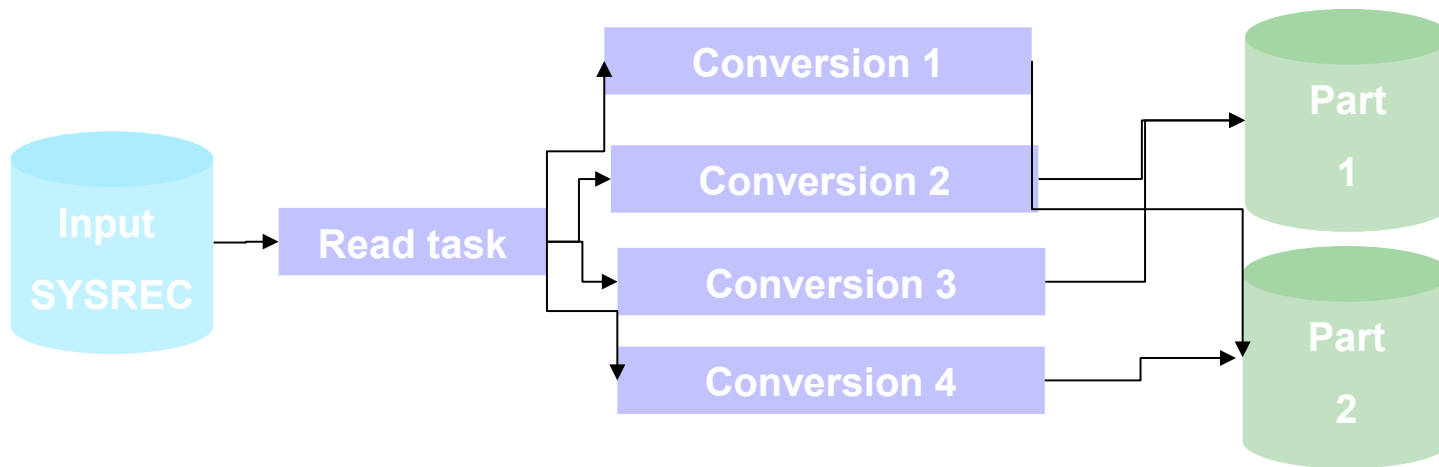
- Parallel data conversion
- Not supported for PBGs
- 50% ET reduction possible on single SYSREC load



LOAD & UNLOAD

LOAD SHRLEVEL CHANGE PARALLEL

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



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
 - INDREFLIMIT
 - 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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Title: DB2 11 Utilities Update



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