

# Db2 Utilities – what is new

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Hendrik “Hennie” Mynhardt  
[mynhardt@us.ibm.com](mailto:mynhardt@us.ibm.com)



# Agenda

- COPY and RECOVER
- UNLOAD and LOAD
- REBUILD INDEX
- REORG
- General

# COPY and RECOVER

FLASHCOPY\_XRCP zparm to support  
RPFC in XRC environments

COPY FLASHCOPY CONSISTENT  
(performance) - PI93390 (

The Flash of paired volumes can now be done  
remotely for both XRC and PPRC by sending  
the command to be done remotely

FC CONSISTENT processing objects at the  
table space level instead of handling them at  
the partition level

# RECOVER

Redirected recovery support

Function Level 500+

New informational messages

- PH27043 – Tablespace support
- PH35266 – Index support

Enhancement – new IX support

- Redirect RECOVER using ICs and LOGS
- Use cases recover production data elsewhere
  - Test Recoveries
  - Test Recovery Times (RTO)
  - Analysis of data – e.g. Forensics
- New FROM keyword
- New TRANSLAT phase to translate OBIDs at target
- New ”-I” messages

**DSNU1569I** RECOVERY LOGPOINT IS X'rsa-or-lrsn'

**DSNU1568I** log-phase -n LOG RECORDS READ,m LOG RECORDS APPLIED

# COPY and RECOVER

## REDIRECTED RECOVER cont.

- PH27043 – Tablespace support
- PH35266 – Index support

Syntax:

```
RECOVER TABLESPACE testdb.testts FROM  
proddb.prodts
```

New messages:

```
DSNU1569I RECOVERY LOGPOINT IS X'rsa-or-  
lrsn'
```

```
DSNU1568I log-phase – n LOG RECORDS READ,  
m LOG RECORDS APPLIED
```

New TRANSLAT phase to translate OBIDs at target  
Target placed in copy-pending after RECOVER

Recommended actions on target after RECOVER  
completion

```
REPAIR CATALOG; Run COPY to create new  
recovery base; REBUILD any indexes; CHECK  
DATA if in CHKP
```

# COPY

TEMPLATE large block interface support

- PH30093

Use case:

LBI allows for better performance – can help decrease CPU utilization and the elapsed time for utilities

LBI also allows utilities to handle much larger blocks with BSAM and allows customers to increase their block size for data sets

TEMPLATE utility now supports LBI via BLKSZLIM

- Prior to this the DFSMS data class attribute need to be changed

```
>>-TEMPLATE--template-name----->
...
>+-----+----->
  '-BLKSZLIM--integer+---'
                    +-K-+
                    +-M-+
                    '-G-'
```

# RECOVER

Incorrect use of SCOPE UPDATED after PIT recovery on SYSLGRNX

- PH20056

When recovering Catalog and Directory TS to a prior PIT

- When recover using TOLOGPOINT or TORBA with SCOPE UPDATED (the default)
- If SYSLGRNX is recovered prior to PIT for the objects, those objects were skipped – RECOVER was fixed
- SCOPE UPDATED will be overwritten to -ALL

# MODIFY RECOVER

## MODIFY RECOVERY FLASHCOPY ONLY

- PH04023

Use case:

Using FCIC and then do a COPYTOCOPY to make a sequential copy, MODIFY deleted both copies together

MODIFY RECOVERY *FLASHCOPY ONLY* will delete the FCIC only and keep the sequential copy

FC space can be re-used next time



# LOAD & UNLOAD

LOAD RESUME SHRLEVEL CHANGE -  
compatibility with online REORG

- PH11255

## REORG SHRLEVEL CHANGE & LOAD RESUME YES SHRLEVEL CHANGE

- Against the same data base objects at same time
- **Note** - REORG would require exclusive control of the target objects in the last LOG iteration and SWITCH phase during which the concurrent utilities would be subjected to typical drain/claim serialization control

# UNLOAD and LOAD

UNLOAD SHRLEVEL CHANGE  
compatibility with online REORG

- PH27915

LOAD support for 3 byte packed  
decimal JULIAN date

- New DATE\_P option on LOAD  
to support x'YYDDDs' format
- PH22944

Use case:

Compatibility with online REORG

LOAD

C1 POSITION(1:3) DATE DATE\_P

C2 POSITION(4:8) DATE EXTERNAL (DATE\_P)

input for C1: '20086C'X

input for C2: 'F2F0F0F8F6'X

# UNLOAD and LOAD

## New LOAD PRESORTED options

1. LOAD PRESORT single DS
  - PH19067
2. LOAD PRESORT multi-input DS  
PH20730
3. LOAD PRESORT Multi-Table
  - PH23105

2) New PRESORT keyword for multiple input data sets, one per partition loaded

Multiple sorts will be allocated (up to one per partition loaded)

3) Sorting of input for multi-table table spaces with the PRESORT keyword.

Each of the tables will be sorted by OBID and Cluster Key

# LOAD & UNLOAD

New LOAD\_RO\_OBJECTS zparm

Permit LOAD utility to load into pagesets started RO

PH26131

- New ZPARM
  - LOAD\_RO\_OBJECTS
    - NO
      - Db2 utilities disallow LOAD with any SHRLEVEL option to load into read-only objects.
    - YES
      - Db2 utilities allow LOAD with any SHRLEVEL option to load into read-only objects.

# LOAD & UNLOAD

LOAD FORCE NONE|READERS|ALL option

- PH24369

LOAD REPLACE SHRLEVEL REFERENCE  
behaviour:

FORCE READERS forces all claimers  
at SWITCH time

FORCE ALL forces writers at  
UTILINIT, all at SWITCH time

- New FORCE option LOAD
  - Action to be taken when the utility is draining the table space.
  - Internal cancel - similar to CANCEL THREAD command
- Notes
  - For LOAD SHRLEVEL CHANGE:
    - Will be ignored
  - For LOAD SHRLEVEL NONE:
    - There is no drain retry processing
    - If FORCE READERS or ALL is specified, the target blocking claimers will be cancelled during the one and only drain all performed at the start of the utility

# UNLOAD and LOAD

## 1. Improve AUTH\_COMPATIBILITY zparm for UNLOAD process

- PH20168

## 2. Consistent copy for LOAD

- PH39300

AUTH\_COMPATIBILITY=SELECT\_FOR\_UNLOAD changed to permit UNLOAD when either SELECT or UNLOAD privilege exists

LOAD REPLACE will now fix up inline copy in INDEXVAL and ENFORCE phases so it can be used for recovery purposes

This APAR also introduces a new TTYPE column value in SYSIBM.SYSCOPY.

With ICTYPE=F and STYPE=R, a new TTYPE value of V indicates that this inline sequential image copy created by LOAD contains pages updated during the INDEXVAL and ENFORCE phases.

# UNLOAD and LOAD

LOAD - better handling of part level inline copies

- PH40709

Prior to this APAR - 2 options:

- COPYDDN at the *TS level* serializes at TS level
- COPYDDN at *part level*, which means *separate* IC for each part, also problems for IC to tape

With this APAR:

- Single COPYDDN at ts level will only serialize and copy parts processed

# LOAD & UNLOAD

Ignore invalid PARALLEL option on  
LOAD - RC0 instead of fail RC8

- PH19073

For LOAD with PARALLEL keyword

- Problem when LOAD issued RC8 when using PARALLEL for some loads – now removed
- PARALLEL option not valid with:
  - SPANNED YES
  - FORMAT INTERNAL
  - INCURSOR
  - PRESORTED
  - FORMAT SQL/DS options
- New message
  - DSNU073I - KEYWORD 'PARALLEL' IGNORED
- SHRLEVEL NONE and CHANGE with LOB and XML columns



# LOAD & UNLOAD

LOAD support for multiple SYSREC datasets  
PI96136

For top-level LOAD syntax

```
TEMPLATE TSREC1 DSN('E44753.DB1.TS1.P00001.SYSREC')  
TEMPLATE TSREC2 DSN('E44753.DB1.TS1.P00002.SYSREC')  
TEMPLATE TSREC3 DSN('E44753.DB1.TS1.P00003.SYSREC')  
LOAD DATA INDDN (TSREC1,TSREC2,TSREC3)
```

For load INTO TABLE PART syntax

```
TEMPLATE TSREC1 DSN('E44753.DBE44753.TSE44753.P00001.SYSREC')  
TEMPLATE TSREC2 DSN('E44753.DBE44753.TSE44753.P00002.SYSREC')  
TEMPLATE TSREC3 DSN('E44753.DBE44753.TSE44753.P00003.SYSREC')  
LOAD DATA RESUME YES LOG YES SORTDEVT SYSDA  
INTO TABLE TBE44753 PART 1 INDDN (TSREC1,TSREC2)  
INTO TABLE TBE44753 PART 3 INDDN (TSREC3)
```

Multiple input data sets in a **single**  
INDDN keyword

- The input data sets are dynamically concatenated

# REBUILD IX

Change REBUILD INDEX on an empty table to end RC0, not RC4

- PH20379

Messages DSNU550I, DSNU551I changed from warning to informational

# REORG

## 1. REORG performance by driving PI build parallelism

- PH28092

## 2. REORG DISCARD NOCHECKPEND

- PH13527

## 1. Skip PI sort, build parts in parallel during RELOAD phase

- Only when no NPSIs exist on table

## 2. Availability option to avoid setting CHKP after discard processing

- Avoids need for separate REPAIR statement
  - When object was in a RI relationship

# REORG

## 1. REORG sort performance with z15

- PH28183

## 2. Always sort NPSI index keys when SORTNPSI is YES

- PH34403

## 1. Support new z15 DFSORT performance improvement

- REORG data sort only (data variable length records, not IX (which is fixed length))
- New zparm UTILS\_USE\_ZSORT

## 2. Also the new zparm: REORG\_PART\_SORT\_NPSI = YES

- Guarantee gathering of NPSI statistics for part-level REORGs
- Performance improvement – so even if a sort is done for 1 part IX, we collect stats for all parts – even if YES vs AUTO

# Db2 Sort

## Support and exploitation of of z15 Integrated Accelerator Sort

- New support from OTC tool
- If installed, used by all IBM utilities and Db2 for z/OS tooling

## Initial improvement comparing current Db2 Sort vs. Db2 Sort using the accelerator:

- LOAD –CPU time improvement up to 12%
- REBUILD INDEX –CPU improvement up to 17%, elapsed time improvement up to 21%
- REORG –CPU improvement up to 8%, elapsed time improvement up to 21%
- This is with only 2 GCPs, and NO zIIPs.
- We expect most customers to have more than 2 GCPs, so the multitasking would provide a better throughput.

# REORG

## Improved handling of REORG inline copies

- PI75518

*Prior to this APAR, performing a multi-part REORG TABLESPACE against a PBR RPN without a valid TEMPLATE (i.e. with &PART. or &PA. specified) in the COPYDDN/RECOVERYDDN keyword would cause REORG to fail with RC8 and message DSNU2922I - PARTITION LEVEL INLINE DATASETS ARE NOT SPECIFIED*

Remove restriction for PBR RPN that part-level inline copies are required

- ICLIMIT *DASD* n
  - Zparm REORG\_ICLIMIT\_DASD
- ICLIMIT *TAPE* n
  - Zparm REORG\_ICLIMIT\_TAPE

Minimum number will be required to manage inline copies for associated LOB tablespaces that must remain separate

DSNU2937I csect-name - SEQUENTIAL INLINE IMAGE COPY PROCESSING

SUMMARY

MAXIMUM NUMBER OF DASD IMAGE COPIES REQUIRED IS a

MINIMUM NUMBER OF DASD IMAGE COPIES REQUIRED IS b

ACTUAL NUMBER OF DASD IMAGE COPIES ALLOCATED IS c

MAXIMUM NUMBER OF TAPE IMAGE COPIES REQUIRED IS d

MINIMUM NUMBER OF TAPE IMAGE COPIES REQUIRED IS e

ACTUAL NUMBER OF TAPE IMAGE COPIES ALLOCATED IS f

DSNU2938I csect-name - UTILITY CANNOT ALLOCATE THE MINIMUM NUMBER OF REQUIRED IMAGE COPY DATA SETS DUE TO KEYWORD OR SUBSYSTEM PARAMETER SPECIFICATION

# REORG

## REORG INDEX performance

- PH25217

## New option - REORG INDEX NOSYSUT1

- Up to 86% ET and 61% CPU savings for REORG INDEX
- Disabled by default in 12
- Enabled via NOSYSUT1 REORG parm or REORG\_INDEX\_NOSYSUT1 zparm
- Because the tasks are now all zIIP eligible, the reduction in non-zIIP CPU was measured to be 50-95%
- **In vNext the NOSYSUT1 option will be ignored and always take effect (M500 onwards)**

# REORG

1. Minimise application impact from REORG drain attempt
  - PH19594
2. Reduce memory consumption for REORG inline copy processing
  - PH19725
3. Avoid pulling in LOB tablespaces when using REORG to convert to PBG if MAXPARTITIONS 1
  - PH18057

1. Prevent drain attempt on first log iteration when REORG doesn't have an accurate estimate of time it will take to process



# REORG

## Change in NOBASIC zparm behaviour

1. Before PH30652
  
2. After PH30652

1. If zparm is NOBASIC is set then REORG would fail if cannot convert to extended
  - Causes problem for pagesets that cannot be converted (e.g. clones)
  - If zparm is EXTENDED then REORG would succeed
2. REORG will succeed even if conversion cannot be done

# RECOVER

Incorrect use of SCOPE UPDATED after  
PIT recovery on SYSLGRNX

- PH20056

## When recovering Catalog and Directory TS to a prior PIT

- When recover using TOLOGPOINT or TORBA with SCOPE UPDATED (the default)
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# UNLOAD and LOAD

1. LOAD RESUME SHRLEVEL CHANGE compatibility with online REORG
  - PH11255
2. UNLOAD SHRLEVEL CHANGE compatibility with online REORG
  - PH27915
3. LOAD PRESORT option
  - PH23105
  - PH34323 delivers up to 24% ET performance improvement for PRESORT

1 and 2 - Compatibility enhancement

3 - Supports both DFSORT and Db2 Sort

# General

New zparm:

UTILS\_BLOCK\_FOR\_CDC

- PH14363

Greater control to prevent disruptive replication refreshes

Prevent utilities from performing any action that triggers a replication target refresh

- CHECK DATA DELETE YES
- LOAD LOG NO
- PIT recovery
- REORG DISCARD
- REPAIR LOCATE DELETE

```
DSNU187I csect-name utility-name UTILITY IS NOT ALLOWED ON  
TABLE SPACE database-name.table-space-name BECAUSE IT  
CONTAINS A TABLE WITH THE DATA CAPTURE CHANGES ATTRIBUTE
```

# Statistics

Simplify sampling for RUNSTATS

- PH07220

Promote use of page sampling  
and auto sampling rate

New zparm STATPGSAMP

Options are NO, YES,  
SYSTEM

## STATPGSAMP ZPARAM

- NO
  - TABLESAMPLE SYSTEM AUTO not executed as default
- YES
  - Ignored if SAMPLE (row level) is specified
  - If TABLESAMPLE SYSTEM specified, it is honored
- SYSTEM
  - Db2 decides default
  - Same meaning as NO
- NONE
  - Added with this APAR
  - Disables TABLESPACE SYSTEM

# General

1. CHECK SHRLEVEL CHANGE resets CHKP/ACHKP
  - PH25593
2. Do not register DSN1COPY with SCRT
  - PH15766
3. New REPAIR WRITELOG option
  - PH11871

2 -VUE customers will no longer see Db2 in SCRT MLC reports

3 - Allow vendors to write LGOPALT diagnostic log record to trigger replication target refresh

# General Statistics

Simplify sampling for RUNSTATS

PH07220

Promote use of page sampling  
and auto sampling rate

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# General Utilities

New Db2 12 support for utility-only dataset open and close

- PH27493

When utilities execute and allocate open datasets, it counts towards DSMAX.

- Utilities now close utility-only datasets proactively after 10 min



# DSN1COMP

## Support for HUFFMAN COMPRESSION

Provide compression ratio estimation for Huffman compression  
PH19242

	Un-compress	Comp Fixed	Compress Huffman
Data (in KB)	9,755	1,783	919
Percent savings		81%	90%
Average Bytes per row	914	169	88
Percent savings		81%	90%
Data Pages needed	2,739	530	256
Percent Data pages saved		80%	90%
Dictionary pages required	0	16	20
Rows scanned to build dictionary		234	234
Rows scanned to provide estimate		10,953	10,953
Dictionary Entries		4,096	4,080
Total Pages (Dictionary + Data)	2,739	546	276
Percent savings		80%	90%

## Db2 12 users of DSN1COMP

- Support compression ratio estimation
- Provide comparison to existing fixed length compression
- New option – COMPTYPE
  - DSN1COMP,PARAM='COMPTYPE(FIXED)'
  - DSN1COMP,PARAM='COMPTYPE(HUFFMAN)'
  - DSN1COMP,PARAM='COMPTYPE(ALL)'

# General

- DSNACCOX performance and scalability improvement
  - PH25108

If many objects in restricted state then DSNACCOX with CRITERIA DBNAME=dbname may not find all objects since internal -DIS DB command can exceed available space

DSNACCOX changed now to use a targeted -DIS DB command when dbname specified in CRITERIA parameter



# Summary

Major enhancements delivered through maintenance stream

Does not include utility support for key engine items

Eg. Multi-table table space conversion to UTS

References:

Recent enhancements to Db2 12 in Knowledge Center