

Agenda

- Availability
- Performance
- Features & function
- Summary

Availability

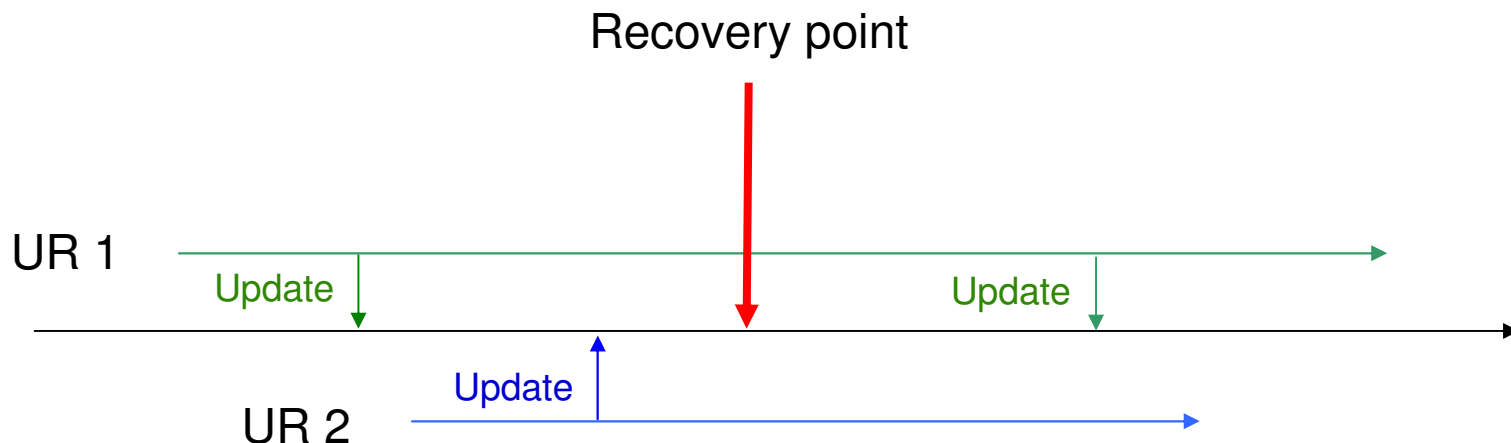
- Ensure utilities are non-disruptive
- Introduction of shadow page set technology
- Introduction of claim & drain processing
- Exploitation of ISO(UR) processing
- SHRLEVEL NONE
- SHRLEVEL REFERENCE
- SHRLEVEL CHANGE

Availability – what has changed recently?

- Online create or rebuild of non-unique indexes
 - ▶ REBUILD INDEX SHRLEVEL CHANGE
- Eliminate outage for partition-level REORGs
 - ▶ Eliminate BUILD2 phase
- Avoid need for REORG to get compressed data
 - ▶ LOAD COPYDICTIONARY
 - ▶ PK63324 & PK63325 (V9)
- Online data consistency checking and repair
 - ▶ CHECK DATA SHRLEVEL CHANGE
 - ▶ CHECK LOB SHRLEVEL CHANGE
 - ▶ REPAIR LOCATE... SHRLEVEL CHANGE
- Run data consistency checks without impacting BACKUP SYSTEM or disk mirroring
 - ▶ PK41711 (V9)

Availability – what has changed recently?

- Replace data with virtually no outage
 - ▶ CLONEs effectively provide LOAD REPLACE SHRLEVEL CHANGE
 - ▶ UTS only
- Read LOB data during REORG
 - ▶ REORG SHRLEVEL REFERENCE for LOBs
- RECOVER to point in time with consistency
 - ▶ Avoid need for QUIESCEs



Performance

- Even with total availability - it still matters!
- Elapsed time
 - ▶ DB2 enhancements
 - ▶ z/OS & architecture improvements
 - ▶ Parallelism
- CPU cost
 - ▶ DB2 enhancements
 - ▶ z/OS & architecture improvements
 - ▶ zIIPs

Performance – what has changed recently?

- Faster REORGs
 - ▶ Parallel unload of partitions
 - ▶ Parallel reload of partitions
 - ▶ Parallel log apply
 - Greater likelihood of REORG keeping up with logging rates
- Faster CHECK INDEX SHRLEVEL REFERENCE
 - ▶ Parallel index processing
- Up to 40% faster COPY & RECOVER RESTORE phase to/from tape
 - ▶ Support Large Block Interface for image copies to tape
- Reduced impact on applications when running COPY
 - ▶ COPY uses MRU for buffers to improve BP hit ratio for online applications
- Reduced impact on applications when running LOAD & REORG
 - ▶ Auto-invalidate of cached dynamic statements on completion of LOAD & REORG
 - ▶ PK47083 (V8 & V9)

Performance – what has changed recently?

- Greater utility parallelism with SORTNUM elimination
 - ▶ PK45916 (V8), PK41899 (V9)
 - ▶ Major improvement in utility sort processing
 - ▶ Simpler, more efficient, more reliant on RTS
- SORTBLD performance improvement
 - ▶ PK60956 (V8 & V9)
 - ▶ Up to 20X performance improvement in SORTBLD for indexes with small SECQTY
- LOAD & REORG performance improvement
 - ▶ PK61759 (V8 & V9)
 - ▶ 10% CPU & elapsed time improvement in RELOAD phase
 - ▶ 10% CPU reduction in SORT phase
- COPY performance improvement
 - ▶ PK74993 (V9)
 - ▶ 20% elapsed time improvement for copy of multiple small datasets to tape
- COPY performance with large LISTDEF lists
 - ▶ PK78865 (V8 & V9)
 - ▶ Reduce writes to SYSUTILX

Performance – what has changed recently?

- Crossloader performance improvement for CCSID data conversion
 - ▶ PK76860 (V8 & V9)
- LOAD/UNLOAD LOB file reference variable performance
 - ▶ PK75216 (V9)
 - ▶ PDS only, not HFS
- UNLOAD performance for multi-table table spaces
 - ▶ UTILINIT phase – use DBD rather than catalog lookup
 - ▶ PK77313 (V8 & V9)
- REORG PART of empty partition performance
 - ▶ Avoid NPI scan for non-clustering indexes
 - ▶ PK67154 (V8 & V9)

Performance – what has changed recently?

- LOAD and UNLOAD to/from virtual file
 - ▶ USS named pipe support with templates
 - ▶ PK70269 (V8 & V9)
- DSN1COPY performance
 - ▶ Improved VSAM buffer allocation for page sets with cylinder allocation
 - ▶ PK78516 (V8 & V9)
- RUNSTATS histogram statistics
 - ▶ Improved query optimization for non-uniform distribution
 - ▶ Example - 1, 3, 3, 4, 4, 6, 7, 8, 9, 10, 12, 15 (sequenced), cut into 3 quantiles

Seq No	Low Value	High Value	Cardinality	Frequency
1	1	4	3	5/12
2	6	9	4	4/12
3	10	15	3	3/12

Performance – what has changed recently?

- 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
- zIIP enablement for utility index processing in V8

Features & function

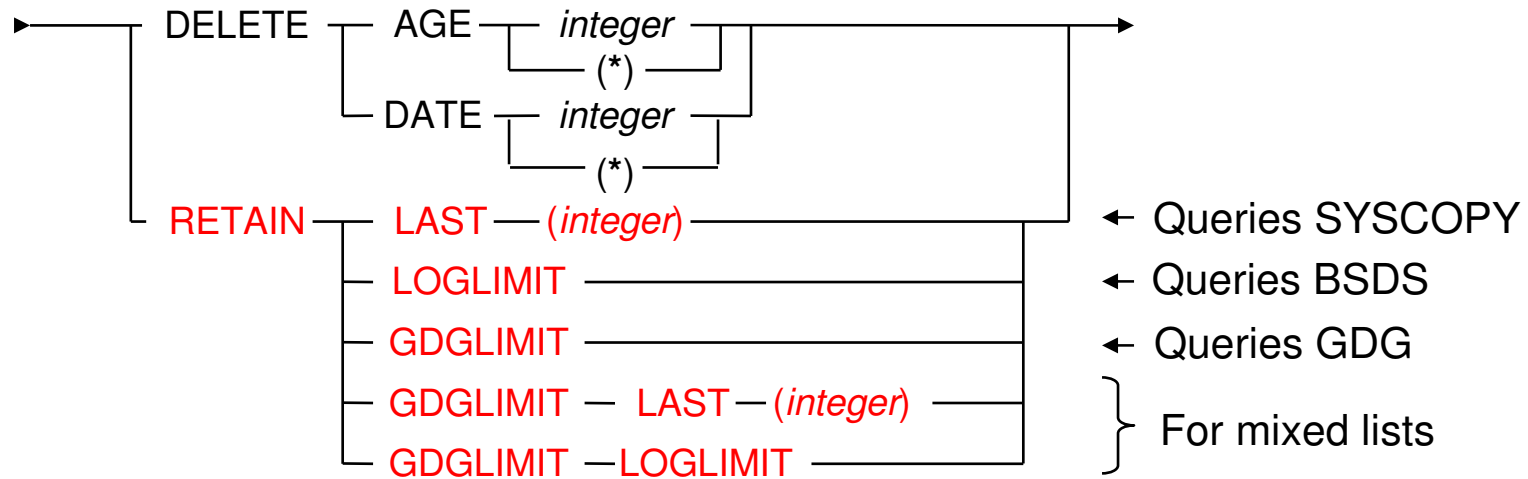
- More powerful utilities for greater flexibility...
- ... yet simpler utilities for reduced complexity
- New utilities & more options
 - ▶ COPYTOCOPY
 - ▶ BACKUP SYSTEM & RESTORE SYSTEM
 - ▶ LISTDEF
 - ▶ TEMPLATE
 - ▶ File Reference Variables
 - ▶ ...
- Intelligent defaults
- Autonomics
- Synergy with Information Management Tools

Features & function – what has changed recently?

- BACKUP SYSTEM & RESTORE SYSTEM enhancements
 - ▶ Support for tape
 - ▶ Support for incremental FlashCopy
- Object-level recovery from system-level backup
- RECOVER to any point in time with consistency
- SORTNUM elimination
 - ▶ Simplified utility invocation
- Remove restriction on REORG of >254 compressed parts
 - ▶ ZPARM restricts LOAD in V9 – restriction removed in X
- Better information for DPRPR/QRep or other IFI 306 readers
 - ▶ Write diag log record at utility termination so IFCID 306 readers can trigger refresh
 - ▶ PK78558 (V9)

Features & function – what has changed recently?

- **MODIFY RECOVERY simplification & safety**



- **Template switching for COPY utility**

- ▶ E.g. copy to disk if small, to tape if large

```

TEMPLATE LRG DSN &DB..&TS..D&DA..T&TI. UNIT=TAPE
TEMPLATE SML DSN &DB..&TS..D&DA..T&TI. UNIT=SYSALLDA LIMIT(20 CYL, LRG)
COPY TABLESPACE SMALL.TS COPYDDN(SML)
COPY TABLESPACE LARGE.TS COPYDDN(SML)
    
```



Features & function – what has changed recently?

- 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
- More information
 - ▶ All utility messages in job output have julian date & timestamp
 - ▶ -DISPLAY UTILITY enhanced to show progress of logapply

DSNU116I csect-name RECOVER LOGAPPLY PHASE DETAILS:

STARTING TIME = timestamp

START RBA = ss START LRSN = rr

END RBA = ee END LRSN = nn

LAST COMMITTED RBA = cc LAST COMMITTED LRSN = ll

ELAPSED TIME = hh:mm:ss

What's coming?

- Remove usability restrictions for REORG
 - ▶ LOBs, PBG, catalog/directory, rebalancing,...
- REORG avoidance
- Remove UTSERIAL lock for greater utility concurrency
- RTS enhancements & greater reliance upon RTS
- Intelligent & autonomic statistics gathering
- BACKUP SYSTEM / RESTORE SYSTEM enhancements
- FlashCopy exploitation
- LOAD & UNLOAD enhancements
 - ▶ Improved LOB/XML processing
 - ▶ Improved UTF-16 support
- CHECK utility enhancements
 - ▶ XML, availability, data correction,...
- Faster point in time recovery
- Faster & better COPY processing
 - ▶ Incremental, CHANGELIMIT, FlashCopy

Summary

- Continuing commitment to & investment in utilities
- Ensure utilities are non-disruptive
 - ▶ Eliminate outages
 - ▶ Improve performance
 - ▶ Reduce CPU cost
- Provide function that adds real value
- Reduce complexity & improve automation