

SQL in V10 of DB2 for z/OS

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AGENDA

PERFORMANCE ENHANCEMENTS

SQL CHANGES

OBJECT CHANGES

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

CONSIDERS THE UNPREDICTABLE DATA IN HOST VARIABLES

RANGE PREDICATES

SIMILAR TO “VOLATILE”

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

BETTER "OR" PROCESSING

BEFORE: MULTIPLE "OR" CONVERTED TO "IN-LIST"

NOW GO FORWARD LOGIC MATCHES ON RANGE

APPLIES TO MULTIPLE "OR" PREDICATES IF

EACH "OR" COMBO MUST

REFER TO SAME TABLE

HAVE AT LEAST ONE MATCHING PREDICATE

USE SAME INDEX

((A = AND B = AND C = AND D >) OR
(A = AND B = AND C >) OR
(A = AND B >) OR
(A >))

CAN APPLY PREDICATES IN ONE INDEX SCAN

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

IMPROVED LIST PREFETCH

FEWER RIDPOOL FAILURES

IF LIMITS EXCEEDED = FAILURE

BUT WHEN RIDPOOL EXHAUSTED

**DB2 WILL USE WORKFILES TO WRITE AND
CONTINUE RIDPOOL PROCESSING**

IMPLEMENTED FOR IN-LISTS

IMPLEMENTED FOR INDEX LEAF PAGES

PAGE-SPLITS?

NON-LEAF PAGE INFO USED TO RETRIEVE LEAF PAGES

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

MORE IN-LIST IMPROVEMENTS

CAN USE LIST PREFETCH

CAN MATCH ON MULTIPLE IN-LISTS

USES TRANSITIVE CLOSURE FOR IN-LIST PREDICATES

REFERENTIAL INTEGRITY IMPROVEMENTS

BEFORE RI TURNED OFF SEQUENTIAL DETECTION AND IX LOOKASIDE
ENFORCEMENT CAN NOW USE CUB FEATURES FOR INSERTS

SEQUENTIAL DETECTION

INDEX-LOOKASIDE

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

MORE PARALLELISM IMPROVEMENTS

CPU PARALLELISM IMPLEMENTED

**IN MULTI-ROW FETCH IF DECLARED AS “READ ONLY”
FOR VIEW (IN-LINE OR REGULAR) MATERIALIZATION
SPECIFIC TYPE OF HYBRID JOIN**

I/O PARALLELISM FOR INDEX INSERTS

**IF I/O WAIT TIME, CONTINUES TO NEXT INDEXES SERIALLY
AFTER ALL INITIATED GOES BACK TO ONE WAITING**

**REBIND ALL PACKAGES THAT DO OR COULD USE PARALLELISM
V10 USES 64-BIT RUNTIME SPACE WITH REBIND**

PERFORMANCE ENHANCEMENTS

BUFFERPOOL IMPROVEMENTS

BP PARAMETER = IN MEMORY OBJECTS

ALL PAGES PRE-LOADED WHEN DATASET OPENED

NON-STEALABLE UNTIL DATASET CLOSES

BPs ALLOCATED “AS NEEDED” – NOT ALL AT ONCE

PERFORMANCE ENHANCEMENTS

JAVA improvements

Data Server Driver for JDBC & SQLJ TYPE 2 CONNECTIVITY

NEW LIMITED BLOCK FETCH

SINGLETON SELECTS WITH “FETCH FIRST ROW ONLY”

STREAMING OF LOB/XML DATA

**QUERY BUFFER WITH 64 BIT ADDRESSING FOR APPS THAT RUN IN
64-BIT JVM**

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

EARLIER STAGE 2 PREDICATE APPLICATION

AND EARLIER STAGE 1 NON-INDEXABLE PREDICATE APPLICATION

**SOME STAGE 2 AND STAGE 1 NON-INDEXABLE PREDICATES
APPLIED TO INDEX DATA BEFORE TABLE ACCESS
SOME EXPRESSIONS AND SCALAR FUNCTIONS
CANNOT BE MATCHING PREDICATES**

PERFORMANCE ENHANCEMENTS

OPTIMIZER IMPROVEMENTS

NEW TABLESPACE ORGANIZATION = HASH ACCESS

TABLE IS NOT CLUSTERED

GOOD FOR INDIVIDUAL UNIQUE ROW ACCESS

HASH-ACCESS CAN BE SPECIFIED

NO INDEX-PROBE

ONE I/O TO THE TABLE

LIKE IMS

PERFORMANCE ENHANCEMENTS

OTHER IMPROVEMENTS

BIND RELEASE DEALLOCATE

APPLIES TO JAVA THREADS

REDUCES PACKAGE RELEASE AND ACQUISITION OVERHEAD
MODIFY DDF – PKGREL (BNDOPT) PARAMETER PLUS
BIND PACKAGE RELEASE(DEALLOCATE)

DDF SELECTS THAT HAVE FETCH 1 ROW ONLY

WERE CONVERTED TO OPEN, FETCH, CLOSE IN ONE CALL

NOW ISSUED AS ONE COMMAND BETWEEN **DRDS** AND THE RDS

PERFORMANCE ENHANCEMENTS

OTHER IMPROVEMENTS

IMPROVEMENT TO DYNAMIC STATEMENT CACHE

CACHE FOR STATEMENTS WITH LITERALS CAN SHARE SPACE OF STATEMENT WITH '?'

ONLY DIFFERENCE MUST BE LITERAL VS. "?"

SPECIFY IN PREPARE STATEMENT ATTRIBUTES

"CONCENTRATES STATEMENTS WITH LITERALS"

LOCK TABLE STATEMENTS AND DYNAMIC DDL HAVE STATEMENT ID 1

PERFORMANCE ENHANCEMENTS

OTHER IMPROVEMENTS

ACCESS TO CURRENTLY COMMITTED IMAGE OF ROW

BOTH STATIC AND DYNAMIC SQL READS

STATIC BIND PARAMETER:

CONCURRENTACCESSRESOLUTION

DYNAMIC PREPARE:

USE CURRENTLY COMMITTED

WAIT FOR OUTCOME

FUNCTIONALITY ENHANCEMENTS

TEMPORAL TABLES

TABLES THAT RECORD THE PERIOD OF TIME WHEN ROWS ARE VALID

CREATE HISTORY TABLE

ALTER TABLE ADD VERSIONING

USE HISTORY TABLE

FUNCTIONALITY ENHANCEMENTS

EXTENDED INDICATOR VARIABLES FOR INSERT, UPDATE, MERGE

:HVCOLUMN :HVIND

:HVIND = TO SAY "NO CHANGE" ON UPDATE or

NULL OR NOT NULL WITH DEFAULT

FEWER INSERT STATEMENTS

FEWER UPDATE STATEMENTS

NO NEED TO RESUPPLY THE CURRENT VALUE FOR A COLUMN!

TREAT AS IF NOT MENTIONED IN SQL

WHY IS THIS A PERFORMANCE IMPROVEMENT?

FUNCTIONALITY ENHANCEMENTS

TIMESTAMP WITH TIMEZONE DATATYPE

MOVING AGGREGATES

MOVING SUMS, AVERAGES, STANDARD DEVIATIONS

FUNCTIONALITY ENHANCEMENTS

IMPROVED CASTING

CHARACTER TO NUMERIC COMPARISONS

NO LONGER NEED TO EXPLICITLY CAST

MORE TIMESTAMP PRECISION

FRACTIONAL SECONDS DEFAULTS TO 6

NOW 0 TO 12 IS SUPPORTED

DDL ENHANCEMENTS

MORE SQL FUNCTIONALITY

ADDITIONAL NON-KEY COLUMNS IN UNIQUE INDEX

VIA **INCLUDE CLAUSE** ON UNIQUE INDEXES

ELIMINATES NEED FOR EXTRA INDEX FOR INDEX-ONLY

DDL ENHANCEMENTS

MORE SQL FUNCTIONALITY

DDL IMPROVEMENT FOR UNIVERSAL TABLESPACES

PARTITIONED BY GROWTH

SPECIFY NUMBER OF DATASETS

ALTER ADD PARTITION

PARTITIONED BY GROWTH & RANGE

BOTH HONOR MEMBER CLUSTER NOW

**REDUCED LATCH CONTENTION DURING
INSERTS**

INSERTS DONE IN AVAILABLE SPACE

NOT CLUSTER ORDER

DDL ENHANCEMENTS

MORE SQL FUNCTIONALITY

REALTIME ALTER OF

PAGE SIZE (TABLESPACE AND INDEXSPACE)

DATASET SIZE

SEGSIZE

MEMBER CLUSTER

TABLESPACE TYPE

PENDING DEFINITION CHANGES

DATABASE EXCEPTION TABLE= DBET

NEW STATUS: AREOR

SUMMARY

- **MANY CHANGES = NEED FOR READDRESSING**
 - **DESIGN STANDARDS**
 - **EXISTING PROGRAMS**
 - **PACKAGE REBIND PARAMETERS**
- **RETRAINING IS KEY TO USING NEW FEATURES**