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Session: F13

The Magic of Rebind

IDUG® 2007

North America

Bonnie Baker
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May 10, 2007 10:40 a.m. – 11:40 a.m.

Platform: DB2 for z/OS



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THE MAGIC OF REBIND

G10

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AGENDA

- **BIND/REBIND INPUT**
- **BIND VS. REBIND**
- **REBINDS BEFORE V8**
- **REBINDS IN V8**
 - PAINLESS REBINDS**
 - MINIMAL EFFORT REBINDS**
 - DESIGN CHANGE REBINDS**
- **FOLLOW UP ON FINDINGS**
- **SUMMARY**

BIND/REBIND INPUT

- WHAT DOES THE OPTIMIZER CONSIDER?

SQL

WHERE CLAUSE
SORT SYNTAX
PREDICATE TYPES
COLUMNS SELECTED!

CATALOG OBJECT INFORMATION

INDEXES (COLUMNS, NLEVELS, NLEAF, ETC.)
LOCKSIZE
NUMBER OF PARTITIONS
LOCKSIZE

CATALOG STATISTICAL INFORMATION

DISTRIBUTION STATISTICS
CLUSTERRATIO
CARD
COLCARD

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BIND/REBIND INPUT cont....

CPU, NUMBER OF ENGINES, ETC.

SYSTEM SOFTWARE

WORKLOAD MANAGER?

RIDPOOL SIZE

BUFFERPOOL PARAMETERS

SIZE, VPPSEQT?

BIND PARAMETERS

DEGREE?

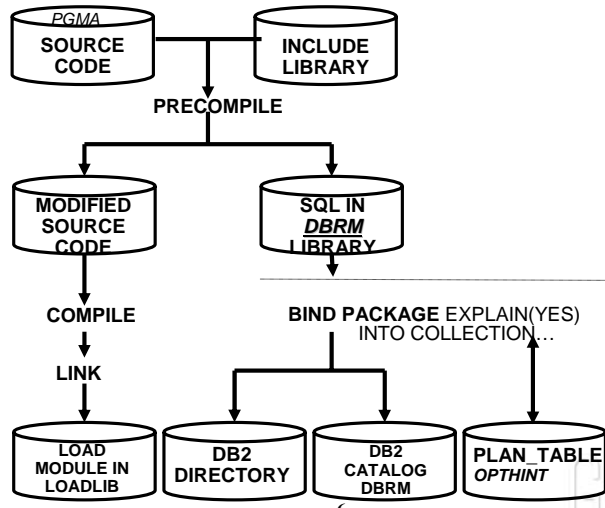
OPTHINT?

AND MORE

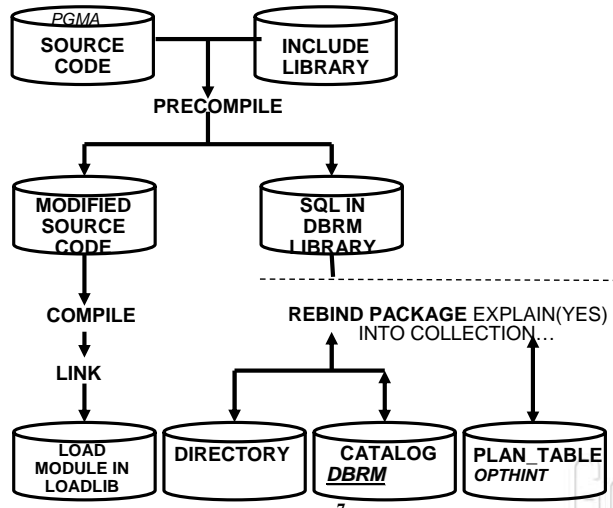
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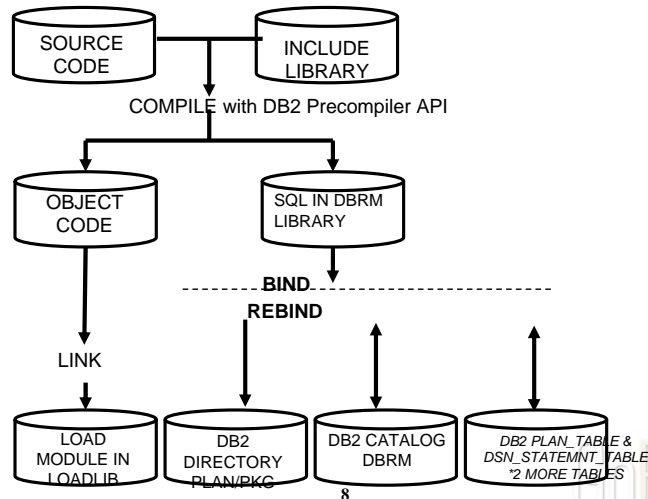
BIND VS. REBIND



BIND VS. REBIND



BIND VS. REBIND – CO-PROCESSOR



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REBIND MAGIC BEFORE V8

- **V2R1 LIST PREFETCH**
- **V2R1 MULTIPLE INDEX ACCESS**
- **V3 CURRENTDATA(NO)**

LOCK AVOIDANCE FOR UNAMBIGUOUSLY READ-ONLY CURSORS
BLOCKING FOR DRDA CLIENTS

- **V4 CURRENTDATA(NO)***

LOCK AVOIDANCE FOR AMBIGUOUS CURSORS
* DEFAULT CHANGED TO (YES)

REBIND MAGIC BEFORE V8

- **V5/V6 INDEX SCREENING WITH LIST PREFETCH**

FEWER RIDPOOL FAILURES
FEWER TABLE PAGE READS =
FEWER GET PAGES, READ IOs, LOCKS, LATCHES, TIMEOUTS

- **HYBRID JOINS**

- **V5/V6 UNIQUENESS DETECTOR**

BETTER INDEX CHOICES
BETTER SORT AVOIDANCE

UNIQUE INDEX ON COLA
ANOTHER INDEX ON COLA, COLB CREATED FOR INDEXONLY ACCESS

EXAMPLE 1: SELECT COLB... WHERE COLA = :HVA

EXAMPLE 2: SELECT WHERE
ORDER BY COLC, COLD, COLA, COLG

REBIND MAGIC BEFORE V8

- **STAGE 2 PREDICATES CONVERTED TO STAGE 1**

SUBSELECTS SATISFIED BY AN IN-LIST
WHERE WORKDEPT IN (SELECT DEPT FROM DEPT_TABLE)

PREDICATE PUSHDOWN:
CURRENT DATE - 1 MONTH

MOST EXPRESSIONS ON THE RIGHT SIDE OF OPERATOR
INTEGER_COLA > :HVSMALLINTEGER1 + :HVSMALLINTEGER2

NON-OPERATIONS: WHERE JOB = :HVJ AND DEPT = :HVD + 0

REBIND MAGIC BEFORE V8

- **V7 MAX/MIN WITH I1 ACCESS**

INDEX ON PONBR ASC + INDEX ON PONBR DESC
REPLACED BY SINGLE INDEX ON EITHER BUT NOT BOTH

- **V7 DSTATS**

NON-INDEX COLUMN DISTRIBUTION STATISTICS

DSTATS & the OPTIMIZER

WHAT IS DSTATS?

DISTRIBUTION STATS ON NON-INDEX COLUMNS
INCORPORATED INTO V8 RUNSTATS

USED FOR?

- 1) **NOT USED TO REARRANGE NON-INDEX PREDICATES**
- 2) **USED TO BETTER DETERMINE NUMBER OF ROWS
THAT WILL FULLY QUALIFY TO BETTER
ESTIMATE SORT SIZE, ETC.**
- 3) **HUGE ADVANTAGE FOR ESTIMATING JOINS**

REBIND MAGIC IN V8

- **TWO INDEXES BECAUSE**

CURSOR 1: ORDER BY LASTNAME DESC, FIRSTNAME DESC

CURSOR 2: ORDER BY LASTNAME, FIRSTNAME -- IMPLIED ASCENDING

- **EXISTS**

WHERE EXISTS (SELECT 1 FROM BIGTABLE WHERE PONBR = :HV PONBR)

WHERE EXISTS (SELECT 1

FROM BIGTABLE

WHERE PONBR = :HV PONBR

AND BIGTABLE.COLA = OUTERTABLE.COLX)

D.IBMREQD = D.IBMREQD **NO LONGER NEEDED** WHEN USING
SYSIBM.SYSDUMMY1 FOR EXISTENCE CHECK

REBIND MAGIC IN V8

- **STAGE 2 PREDICATES NOW STAGE 1**

COLA = :LONGER-HV-OR-LITERAL
BETTER PATH
REDUCED LOCKING OVERHEAD

- **TRANSITIVE CLOSURE**

BETWEEN INNER/OUTER SELECTS
BETWEEN WHERE/ORDER BY

REBIND MAGIC IN V8

- **INDEX-ONLY ACCESS FOR INDEX VARCHAR DATA**

```
SELECT COLB FROM BIGTABLE WHERE COLA = :HVA  
INDEX ON COLA, COLB  
COLA IS CHAR(30)  
COLB IS VARCHAR(40)
```

- **NON-INDEX COLUMN DISTRIBUTION STATISTICS**

```
NOW PART OF RUNSTATS  
JOIN ORDER  
SORT SIZE
```

- **OTHER RUNSTATS CHANGES**

```
TEN LEAST COMMON VALUES FOR INDEX COLUMNS
```


REBIND MAGIC IN V8

- **MORE EXPLAIN INFORMATION**

13 TABLES OF EXPLAIN INFORMATION

BINDING INTO A PRODUCTION COLLECTION THAT IS NOT BOUND INTO ANY PLAN CAN HELP
REDUCE IMPACT ON PRODUCTION SYSTEM

- **SINGLETON SELECT LOCKING CHANGES**

CURRENTDATA APPLIES TO SEARCHED SELECTS

REBIND MAGIC IN V8

- **CHANGING CLUSTER INDEX IS EASIER**

BEFORE: DROP AND RECREATE TO CHANGE THE CLUSTER INDEX

NOW: ALTER, REORG, RUN RUNSTATS
REBIND ONLY SELECTED PROGRAMS
EASIER TO HAVE POINT-IN-TIME CLUSTER INDEXES

- **WHAT IF NO CLUSTER INDEX?**

FORCED MAGIC

**ANY PROGRAM REFERENCING SYSDUMMY1
WILL BE INVALIDATED DURING MOVE TO NEW
FUNCTION MODE**

SUMMARY

- **REBIND UNDER V7 BEFORE GOING TO V8? WHY?**
- **PAYBACK FROM REBINDS CAN OFFSET ADDITIONAL CPU OVERHEAD OF V8**
- **RE-ADDRESS OLD PROGRAMMING STANDARDS**
- **THINK ABOUT RETRAINING**

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