IBM

RUG January 2007

DB2 9 on z/OS

mats.brunnstedt@se.ibm.com

ON DEMAND BUSINESS™

Intro

- Who am I?
  Former IBM customer 83-00
  IBM SW defect support
  IBM zSeries HW tech sales support

- My 2006
  Speciality engines – zAAP, zIIP
  DB2 Data sharing
  DB2 Admin Server (Control Center)
  Websphere POC/Pilot
  JZOS (java batch) WSAD

Agenda

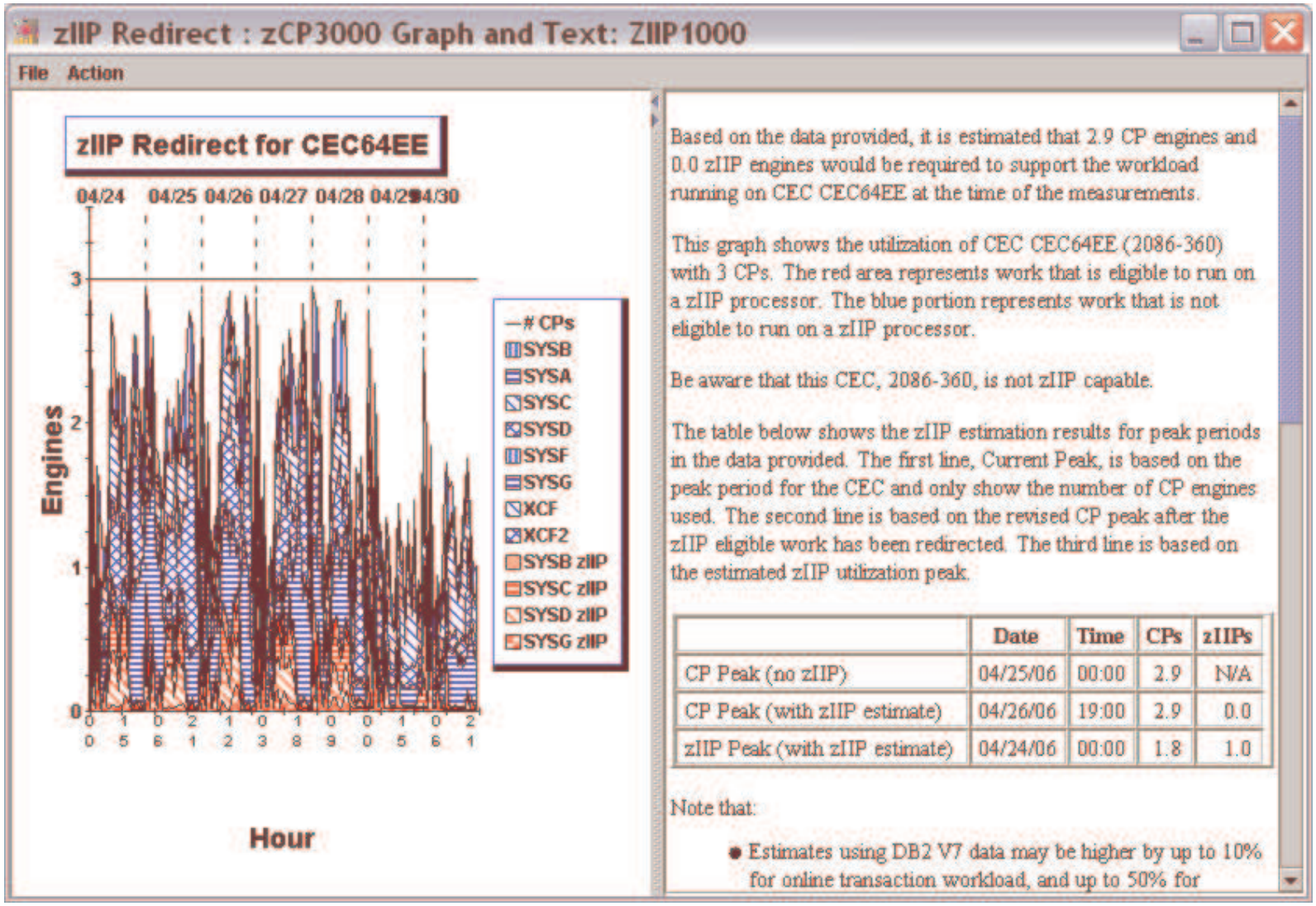
- zIIP
- DB2 9 on z/OS + small demo
  Clone table
  Index on expression

Helping customers integrate data across the enterprise

The new IBM System z9 Integrated Information Processor (IBM zIIP)

- z/OS and z/OS.e manages and directs work between the general purpose processor and the zIIP
  - No changes anticipated to DB2 Universal Database™ (UDB) for z/OS V8 applications
  - Number of zIIPs per System z9 not to exceed number of general purpose processors
  - Price for each zIIP - roughly 1/4-1/3 of a “gp”
  - **No IBM software charges on the zIIP – consistent with other specialty engines**
- DB2 UDB for z/OS V8 will be first IBM exploiter of the zIIP with:
  - System z9 EC and z9 BC
  - z/OS and z/OS.e 1.6 or later
  - DB2 UDB for z/OS V8
- Portions of the following DB2 UDB for z/OS V8 workloads may benefit from zIIP:
  - ERP, CRM, Business Intelligence and other enterprise applications – via DRDA® over a TCP/IP connection
  - Data warehousing applications – requests that utilize long running parallel queries
  - DB2 UDB for z/OS V8 utilities – select internal DB2® utility functions used to maintain index maintenance structures

zIIP Analysis using zCP3000



Sample RMF Workload Activity Report with zIIP enablement code

IIP : Effective zIIP % using zIIP installed engines

IIPCP : Projected zIIP % if zIIP engines where installed

BENCHRES.FSS.F60706R3.T1446.SYSPLX.txt - Notepad

File Edit Format View Help

```
1                                  W O R K L O A D   A C T I V I T Y                                    PAGE    6

        z/OS V1R7                SYSPLEX ZBPLEX              START 07/06/2006-14.48.00 INTERVAL 000.03.59   MODE = GOAL
                                 RPT VERSION V1R7 RMF        END   07/06/2006-14.51.59

                                          POLICY ACTIVATION DATE/TIME 06/21/2006 11.34.40

------------------------------------------------------------------------------------------------------------------- SERVICE CLASS PERIODS

REPORT BY: POLICY=POL1       WORKLOAD=BATCH      SERVICE CLASS=BATCH      RESOURCE GROUP=*NONE      PERIOD=1 IMPORTANCE=3
                                                 CRITICAL     =NONE

TRANSACTIONS    TRANS-TIME HHH.MM.SS.TTT  --DASD I/O--  ---SERVICE----  SERVICE TIMES  ---APPL %---  PAGE-IN RATES   ---STORAGE---
AVG      0.78   ACTUAL           4.15.130  SSCHRT  88.4  IOC       295  CPU     383.9  CP     118.74  SINGLE     0.0  AVG    1703315
MPL      0.78   EXECUTION        4.14.579  RESP    20.4  CPU     10037K SRB       0.0  AACP     0.00  BLOCK      0.0  TOT    1336017
ENDED       1   QUEUED                550  CONN    15.7  MSO         0  RCT       0.0  IIPCP   25.39  SHARED     0.0  CEN    1336017
END/S    0.00   R/S AFFIN               0  DISC     4.3  SRB        62  IIT       0.0                 HSP        0.0  EXP       0.00
#SWAPS      0   INELIGIBLE              0  Q+PEND   0.4  TOT     12901K HST       0.0  AAP      0.00  HSP MISS   0.0
EXCTD       0   CONVERSION          2.097  IOSQ     0.0  /SEC    53754  AAP       0.0  IIP     41.23  EXP SNGL   0.0  SHR       0.00
AVG ENC  0.00   STD DEV                 0                               IIP      98.9                 EXP BLK    0.0
REM ENC  0.00                                              ABSRPTN    69K                           EXP SHR    0.0
MS ENC   0.00                                              TRX SERV   69K

GOAL: EXECUTION VELOCITY 25.0%     VELOCITY MIGRATION:   I/O MGMT  68.7%     INIT MGMT 68.7%

            RESPONSE TIME EX    PERF  AVG    ------ USING% -----  ------------ EXECUTION DELAYS % ------------  ---DLY%--  -CRYPTO%-     %
SYSTEM                    VEL%  INDX ADRSP    CPU  AAP  IIP   I/O   TOT  CPU   IIP   I/O                      UNKN IDLE  USG  DLY QUIE

ZB01          --N/A--     68.7   0.4   1.6   39.3  0.0 13.6   2.9  25.4 19.7   4.5   1.2                      18.9  0.0  0.0  0.0  0.0

------------------------------------------------------------------------------------------------------------------- SERVICE CLASS(ES)
```

DB2 9 for z/OS Highlights

- SHRLEVEL(REFERENCE) for REORG of LOB tablespaces
- Online RENAME COLUMN
- Online RENAME INDEX
- Online CHECK DATA and CHECK LOB
- Faster REORG by intra-REORG
- SHRLEVEL(REFERENCE) for parallelism
- More online REORG by eliminating BUILD2 phase
- LOB Locks reduction
- Skipping locked rows option
- Online REBUILD INDEX
- Renaming SCHEMA
- Renaming VCAT
- Tape support for BACKUP and RESTORE SYSTEM utilities
- Recovery of individual tablespaces and indexes from volume-level backups
- Enhanced STOGROUP definition
- Utility TEMPLATE switching
- Conditional restart enhancement: automatic search for the appropriate checkpoint
- Removing more reasons for 'soft' outages
- Buffer management by WLM
- Global query optimization
- Generalizing sparse index and inmemory
- data caching method
- Optimization Service Center
- Autonomic reoptimization
- Logging enhancements
- LOBs Network Flow Optimization
- Faster operations for variablelength rows
- NOT LOGGED tablespaces
- Index on expressions
- Universal Tablespaces
- Partition-by-growth tablespaces
- APPEND option at insert
- Autonomic index page split
- Different index page sizes
- Support for optimistic locking
- Faster and more automatic DB2 restart
- MODIFY RECOVERY enhancements
- RLF improvements for remote application servers such as SAP
- Preserving consistency when recovering individual objects to a prior point in time
- CLONE Table: fast replacement of one table with another
- Index compression
- DECIMAL FLOAT
- BIGINT
- VARBINARY, BINARY
- TRUNCATE TABLE statement
- MERGE statement
- FETCH CONTINUE
- ORDER BY and FETCH FIRST n ROWS in sub-select and full-select
- ORDER OF extension to ORDER BY
- Various scalar functions
- XML support in DB2 engine
- Enhancements to SQL Stored Procedures
- SELECT FROM UPDATE/DELETE/MERGE
- Enhanced CURRENT SCHEMA
- IP V6 support
- Unified Debugger
- Trusted Context
- Database ROLEs
- Automatic creation of database objects
- Modify early code without requiring an IPL
- Utilities CPU reduction
- Temporary space consolidation
- . . .

DB2 Family SQL

z z/OS V7
common
LUW Linux, Unix & Windows V8.2

z

common

Inner and Outer Joins, Table Expressions, Subqueries, GROUP BY, Complex Correlation, Global Temporary Tables, CASE, 100+ Built-in Functions, Limited Fetch, Insensitive Scroll Cursors, UNION Everywhere, MIN/MAX Single Index Support, Self Referencing Updates with Subqueries, Sort Avoidance for ORDER BY, and Row Expressions, Call from trigger, statement isolation

LUW

Updateable UNION in Views, ORDER BY/FETCH FIRST in subselects & table expressions, GROUPING SETS, ROLLUP, CUBE, INSTEAD OF TRIGGER, EXCEPT, INTERSECT, 16 Built-in Functions, MERGE, Native SQL Procedure Language, SET CURRENT ISOLATION, BIGINT data type, file reference variables, SELECT FROM UPDATE, DELETE & MERGE, multi-site join, 2M Statement Length, GROUP BY Expression, Sequences, Scalar Fullselect, Materialized Query Tables, Common Table Expressions, Recursive SQL, CURRENT PACKAGE PATH, VOLATILE Tables, Star Join Sparse Index, Qualified Column names, Multiple DISTINCT clauses, ON COMMIT DROP, Transparent ROWID Column, FOR READ ONLY KEEP UPDATE LOCKS, SET CURRENT SCHEMA, Client special registers, long SQL object names, SELECT from INSERT

DB2 Family SQL

z z/OS V8
common
LUW Linux, Unix & Windows V8.2

z

Multi-row INSERT, FETCH & multi-row cursor UPDATE, Dynamic Scrollable Cursors, GET DIAGNOSTICS, Enhanced UNICODE for SQL, join across encoding schemes, IS NOT DISTINCT FROM, Session variables

common

Inner and Outer Joins, Table Expressions, Subqueries, GROUP BY, Complex Correlation, Global Temporary Tables, CASE, 100+ Built-in Functions including SQL/XML, Limited Fetch, Insensitive Scroll Cursors, UNION Everywhere, MIN/MAX Single Index Support, Self Referencing Updates with Subqueries, Sort Avoidance for ORDER BY, and Row Expressions, 2M Statement Length, GROUP BY Expression, Sequences, Scalar Fullselect, Materialized Query Tables, Common Table Expressions, Recursive SQL, CURRENT PACKAGE PATH, VOLATILE Tables, Star Join Sparse Index, Qualified Column names, Multiple DISTINCT clauses, ON COMMIT DROP, Transparent ROWID Column, Call from trigger, statement isolation, FOR READ ONLY KEEP UPDATE LOCKS, SET CURRENT SCHEMA, Client special registers, long SQL object names, SELECT from INSERT

LUW

Updateable UNION in Views, ORDER BY/FETCH FIRST in subselects & table expressions, GROUPING SETS, ROLLUP, CUBE, INSTEAD OF TRIGGER, EXCEPT, INTERSECT, 16 Built-in Functions, MERGE, Native SQL Procedure Language, SET CURRENT ISOLATION, BIGINT data type, file reference variables, SELECT FROM UPDATE, DELETE & MERGE, multi-site join

DB2 SQL

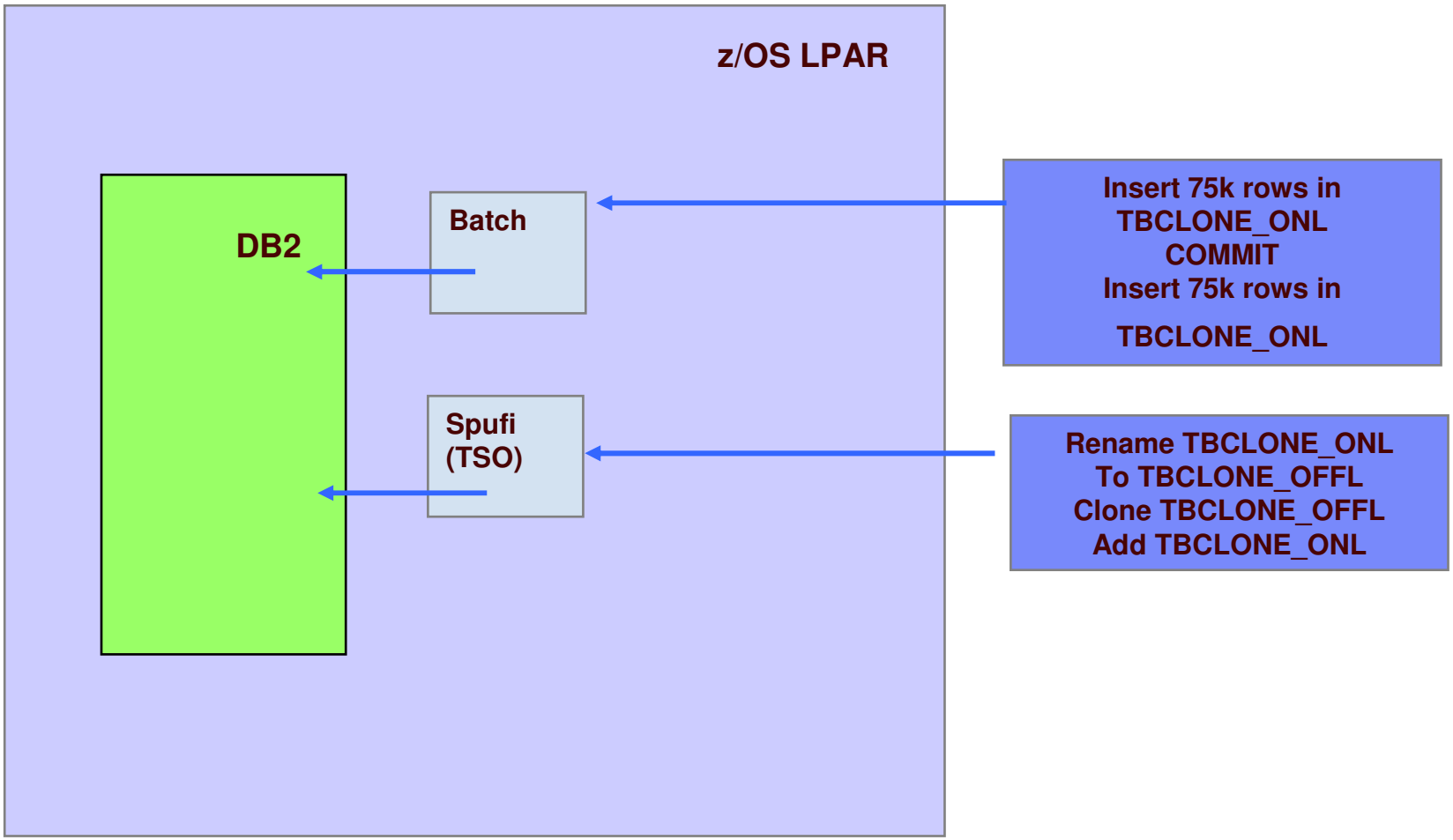
z z/OS V9
common
LUW Linux, Unix & Windows Viper

z
Multi-row INSERT, FETCH & multi-row cursor UPDATE, Dynamic Scrollable Cursors, GET DIAGNOSTICS, Enhanced UNICODE for SQL, join across encoding schemes, IS NOT DISTINCT FROM, Session variables, range partitioning, TRUNCATE, DECIMAL FLOAT, VARBINARY, optimistic locking, FETCH CONTINUE, ROLE, MERGE

common
Inner and Outer Joins, Table Expressions, Subqueries, GROUP BY, Complex Correlation, Global Temporary Tables, CASE, 100+ Built-in Functions including SQL/XML, Limited Fetch, Insensitive Scroll Cursors, UNION Everywhere, MIN/MAX Single Index Support, Self Referencing Updates with Subqueries, Sort Avoidance for ORDER BY, and Row Expressions, 2M Statement Length, GROUP BY Expression, Sequences, Scalar Fullselect, Materialized Query Tables, Common Table Expressions, Recursive SQL, CURRENT PACKAGE PATH, VOLATILE Tables, Star Join Sparse Index, Qualified Column names, Multiple DISTINCT clauses, ON COMMIT DROP, Transparent ROWID Column, Call from trigger, statement isolation, FOR READ ONLY KEEP UPDATE LOCKS, SET CURRENT SCHEMA, Client special registers, long SQL object names, SELECT from INSERT, UPDATE, DELETE & MERGE, INSTEAD OF TRIGGER, Native SQL Procedure Language, BIGINT, file reference variables, XML, FETCH FIRST & ORDER BY in subselect and fullselect, caseless comparisons, INTERSECT, EXCEPT, RANK, not logged tables

LUW
Updateable UNION in Views, GROUPING SETS, ROLLUP, CUBE, 16 Built-in Functions, SET CURRENT ISOLATION, multi-site join, MERGE

Clone table


z/OS LPAR
DB2
Batch
Spufi
(TSO)
Insert 75k rows in
TBCLONE_ONL
COMMIT
Insert 75k rows in
TBCLONE_ONL
Rename TBCLONE_ONL
To TBCLONE_OFFL
Clone TBCLONE_OFFL
Add TBCLONE_ONL

Demo

Any comments / questions?