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CTC07W1:
PERFORMANCE TUNING IN THE "REAL WORLD"
PART 1

CADRE/CA DATACOM TECHNICAL CONFERENCE
CTC REPLAY WEBCAST – MAY 2015

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ABSTRACT

With limited and reducing resources (both human and infrastructure) this session describes tuning methods that achieved significant cost reductions alongside both performance and service improvements at mixed Datacom, SQL, Ideal and MetaCOBOL+ installations.

It also covers enhancements over several CA Datacom releases that change the way we approach tuning.

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For the last 15 years he has worked with a variety of z/OS and z/VSE clients on projects ranging from OS and software upgrades to Web enablement and XML interfaces.

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THE "REAL WORLD" – A BRIEF HISTORY

1960s and 1970s – pre-history (for us in Europe anyway)

1980s – the brave new world of RDBMS (Datacom) and 4GL (Ideal)

- Rapid application development

- Speed of development vs. Quality

1990s – the "Loads of money" era

- Rapid business expansion

- Large IS departments with QA teams

- Bigger boxes

THE "REAL WORLD" – A BRIEF HISTORY

2000s - Y2K backlash and the recession

- Y2K was a massive IT success, but not perceived as such
  - QA teams eliminated, deep cost-cutting
- Mainframe perceived as "legacy" and "outdated"
  - Experienced IT staff moved to other platforms/companies
  - Outsourcing to reduce costs
  - Migration projects
- Recession brings change Ice-Age

2010s – Cost control era

- Mainframe can be lowest cost (by far)
- It is our job to make it so

THE "REAL WORLD" – TODAY'S ENVIRONMENT

Much smaller IT department – examples:

Major European retailer
- Datacom/Ideal/MetaCOBOL+ runs almost all mission critical systems
- 0.6 of a Datacom DBA (average 3 days per week)
- Capped at 26 MSU's (down from 37 MSUs in 18 months)

Financial institution
- Datacom/Ideal runs almost all mission critical applications
- 0.25 of a Technical Consultant (average 5 days per month)
  - Includes z/VSE and all OEM products
- Capped at 100 MIPS. No night shift

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THE "REAL WORLD" – TODAY'S MAINFRAME IT REMIT

Reducing the TCO of the mainframe.

– Doing more with less

– Every new "business benefit" application/change must be cost justified

Tuning includes:

– Reducing costs of existing infrastructure

– Identifying and eliminating redundant processing

– Consolidating software portfolio

– Reducing risk

  • Each outage is expensive

  • Leads to expensive over-capacity to allow for outages

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SO LET'S GET STARTED!

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ACCESS OPTIMIZE

Introduced in Datacom 9.0

Introduced as DEFAULT (hint hint!)

The clue's in the name

Don't throw away precious cached data

- Especially with zIIP

CDC has eliminated the need for shared "read only" MUFs

Several new features require OPTIMIZE as pre-requisite

Requires DBUTLTY SYSIN changes

- All can be pre-applied before implementing OPTIMIZE

It's time – Please, please, please: just do it!

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SIMPLIFY FEATURE (Z/OS ONLY)

IT'S NOT JUST FOR NEW SITES

Easier than we thought to implement – even for 30+ year old sites

- Rename CXX to match HLQ rather than renaming DSNs
    - E.g. MUF=PMUF00 and DSN=UDBSPB.A01100 etc. CXXNAME -> UDBSPB
    - Only a very few housekeeping applications depend on CXX name

Protects against many JCL errors

- Eliminates the need for DBUTLTY external security overhead for some sites
- Reducing risk of outage

Mandatory for Datacom/AD installations

Automates the ACCESS controls to simplify OPTIMIZE implementation

Provides <u>very</u> valuable audit of DBUTLTY activity in MUF JESMSGLG

- Critical information for ONLINE_AREA_MOVE implementation

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SIMPLIFY MESSAGES

03.41.17 DB00141I - DBUTLTY START LOAD-U 140 F03 USTMP960

03.41.17 DB00607I - BASE 139 ACCESS OFF (BASE IS OPEN WRITE) JOB-USTMP957

03.41.17 DB00904I - CLOSED, BASE -   139

03.41.17 DB00903I - OPENED, BASE -   139

03.41.17 DB00141I - DBUTLTY START INIT 139 IXX USTMP957

03.41.17 DB00141I - DBUTLTY END   LOAD-U 140 F03 USTMP960

03.41.17 DB00607I - BASE 140 ACCESS WRITE (BASE IS OPEN WRITE) JOB-USTMP960

03.41.18 DB00141I - DBUTLTY END   INIT 139 IXX USTMP957

03.41.18 DB00141I - DBUTLTY START RETIX-U 139 A02 USTMP957

03.41.18 DB00141I - DBUTLTY END   RETIX-U 139 A02 USTMP957

03.41.18 DB00141I - DBUTLTY START RETIX-U 139 A03 USTMP957

03.41.19 DB00102I - ENDED   JOB-PBDCU001 NUMBER-17057

03.41.22 DB00141I - DBUTLTY END   RETIX-U 139 A03 USTMP957

03.41.22 DB00141I - DBUTLTY START LOAD-U 139 F01 USTMP957

03.41.23 DB00141I - DBUTLTY END   LOAD-U 139 F01 USTMP957

03.41.26 DB02805I - DBUTLTY LOCK MOVER 141 A02 USTMP965 17058

03.41.26 DB02805I - DBUTLTY UNLOCK MOVER 141 A02 USTMP965 17058

03.41.26 DB00903I - OPENED, BASE -   141

03.41.26 DB00141I - DBUTLTY START EXTRACT-U-P 141 F02 USTMP965

03.41.27 DB00141I - DBUTLTY END   EXTRACT-U-P 141 F02 USTMP965

SHADOW MUF

Basic shadow (no coupler) easy to implement

- Make sure you are on current maintenance

Eliminates perceived "Single point of failure"

Quick swap for maintenance

Can be used for Datacom 14.0 to 15.0 upgrade

CICS Services much better at reconnecting now

DYNAMIC EXTEND

RC 07/08 should **NEVER** occur in a Production environment.

- No excuses

Dynamic Extend can be initiated manually

- Before 100% condition occurs

Extend attribute changes can now be applied on-the-fly

- New 1000 ALTER transaction

Online Area Move

- For datasets nearing extent limits
- To move to larger 3390 models

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DYNAMIC EXTEND - DDUPDATE

```
//* *--------------------------------------------------------
//* * UPDATE DYNAMIC EXTEND ATTRIBUTES FOR DATA AREA ON-THE-FLY
//* *--------------------------------------------------------
//DDUPD1   EXEC DDUPDATE,ID=P
//SYSIN    DD *
-USR DEV049
-UPD AREA,PCWB-DPCH(PROD)
1000 ALTER
1000 ENABLE
1500 DYNAMIC-EXTEND,C
1500 DYN-EXT-TRACKS,50
-END
```

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OK ENOUGH ABOUT RISK REDUCTION. LET'S GET MORE SPEED!

OLD MAINFRAME ENVIRONMENT

Balancing CPU vs IO vs limited real storage

DASD was expensive

How much **real** storage did your mainframe have when Datacom was last tuned?

- How much does it have now?

- IXX/DXX/DATA Buffers

- MEMLIMIT

- MRDF areas probably need adjustment

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DATACOM 14.01 - THE GAME CHANGER   (Z/OS)

90%+ MUF CPU offload to zIIP

- If MUF is a significant CPU user and you don't have a zIIP, buy one (or negotiate one at your next CPU replacement cycle)

Now MUF CPU is "cheap"

- Move as much CPU processing to MUF as possible
    - But remember SQL PROCEDURE code is NOT zIIP eligible
- SQL instead of RAAT trawling or SAAT application joins
- Old Extract → Sort → Print applications should be reviewed

IO is expensive (cannot run on zIIP)

- Buffers and MRDF tuning again

COMPRESSION

Datacom 11 and below

- Large block sizes bad for performance if using compression
- Some sites removed compression aggressively

Datacom 12 and above

- DATAFS makes compression much better with large block
- Half-track blocking beneficial for almost all data areas

Reconsider compression

- Less MUF IO (More rows per block)
- Less DASD (on primary/clones and DR)
- All compression/expansion CPU is on zIIP

```
SELECT CAST(A.DBID AS NUMERIC(4,0)) AS DBID,
        A.AREA_NAME AS ARA,
        D.BLOCK_LENGTH AS BLKSZ,
    CAST(D.IN_USE_BLOCKS AS NUMERIC(7,0)) AS #BLOCKS,
        A.LOGICAL_READS AS LGLREADS,
    CAST(A.LOGICAL_WRITES AS NUMERIC(9,0)) AS LGLWRITES,
    CAST(A.PHYSICAL_READS AS NUMERIC(9,0)) AS PHYSREADS,
    CAST(PHYSICAL_WRITES AS NUMERIC(9,0)) AS PHYSWRITES,
    CAST((M.MEMORY_SIZE/(1024 * 1024))
        AS NUMERIC(6,2)) AS M_MEGS,
        M.TOTAL_READS AS M_TOT_READS,
    CAST(M.ACTIVE_READS + VALUE(M.NONFIRST_READS,0)
        AS NUMERIC(9,0)) AS M_PHYSIO,
        M.MRDF_READS AS M_SAVED_READS ,
    CAST((M.MRDF_READS / (M.MEMORY_SIZE / (1024*1024)))
        AS NUMERIC(9,0)) AS SAVED_PER_MB
    FROM SYSADM.MUF_AREA_STATS A, SYSADM.DIR_DATASET D,
        SYSADM.MUF_COVEREDVIRTUAL M
  WHERE A.DBID              = M.DBID
    AND A.AREA_NAME         = M.AREA_NAME
    AND A.DBID              = D.DBID
    AND A.AREA_NAME         = D.AREA_NAME
    AND M.VIRTUAL_COVERED = 'C'
  UNION ALL
```

MRDF TUNING (QUERY CONTINUED)

```
SELECT CAST(A.DBID AS NUMERIC(4,0)) AS DBID,
       A.AREA_NAME AS ARA,
       D.BLOCK_LENGTH AS BLKSZ,
  CAST(D.IN_USE_BLOCKS AS NUMERIC(7,0)) AS #BLOCKS,
       A.LOGICAL_READS AS LGLREADS,
  CAST(A.LOGICAL_WRITES AS NUMERIC(9,0)) AS LGLWRITES,
  CAST(A.PHYSICAL_READS AS NUMERIC(9,0)) AS PHYSREADS,
  CAST(PHYSICAL_WRITES AS NUMERIC(9,0)) AS PHYSWRITES,
  CAST((((D.BLOCK_LENGTH / 1024) * D.IN_USE_BLOCKS) / 1024)
       AS NUMERIC(6,2)) AS M_MEGS,
       0 AS M_TOT_READS,
       0 AS M_PHYSIO,
       0 AS M_SAVED_READS,
  CAST((A.PHYSICAL_READS / (((D.BLOCK_LENGTH / 1024) *
       D.IN_USE_BLOCKS) / 1024)) AS NUMERIC(9,0))
       AS SAVED_PER_MB
   FROM SYSADM.MUF_AREA_STATS A, SYSADM.DIR_DATASET D
 WHERE A.PHYSICAL_READS > 1
   AND ((D.BLOCK_LENGTH / 1024) * D.IN_USE_BLOCKS) > 1024
   AND A.DBID = D.DBID
   AND A.AREA_NAME = D.AREA_NAME
 ORDER BY 13 DESC;
```

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MRDF TUNING QUERY OUTPUT (UN-TUNED)

DBID	ARA	BLKSZ	#BLOCKS	LGLREADS	LGLWRITES	PHYSREADS	PHYSWRITES	M_MEGS	M_TOT_READS	M_PHYSIO	M_SAVED_READS	SAVED_PER_MB
427	IXX	4096	33861	66547228738	89377	113746	32945	177.14	526300776	113746	526187030	2970448
183	IXX	4096	503	216858272	11045	1686678	519	1.00	0	0	0	1686678
110	IXX	4096	807	3852734188	4282	794	489	5.90	3603580	794	3602786	609995
439	IXX	4096	339	124462791	64946	518557	11350	1.00	0	0	0	518557
105	IXX	4096	403	74063183	39410	389532	7339	1.00	0	0	0	389532
117	IXX	4096	65459	7763689551	95201	62198	13237	417.18	130385133	62198	130322935	312384
266	IXX	4096	7422	3889392313	57967	7801448	10702	28.00	0	0	0	278623
101	IXX	4096	32702	1027152267	985249	537423	157608	42.18	11806414	537423	11268991	267116
117	A15	27998	2059	583389525	1984521	2059	96325	72.68	17768837	2066	17766771	244451
120	A03	4096	17	1711278	2107	17	161	0.23	57304	17	57287	244424
...												
110	IXX	4096	807	3852734188	4282	794	489	3.00	0	0	0	264
239	IXX	4096	1230	6052474	541	1031	80	4.00	0	0	0	257
131	A01	27998	1297	98056	586	15353	586	59.11	30349	15353	14996	253
404	A02	27998	20401	11936932	7002638	134119	14681	537.00	0	0	0	249
130	A02	27998	5596	27355	679	3876	208	147.00	0	0	0	26
120	A05	27998	6	774	801	6	132	5.34	137	6	131	24
5	A02	4096	3045	1317	1809	258	208	11.00	0	0	0	23

DBUTLTY TUNING

IMPORTANT FOR Z/OS AND ESPECIALLY Z/VSE

REGION=0M on JCL EXEC in z/OS

Large partition (50M) in z/VSE

Master list IXX/DXX/Data buffers (especially in z/VSE)

Half-track blocking for Data Areas

Area level controls

- – Eliminate negative dependencies
- – Sometimes appropriate, sometimes not

BLKSIZE=nnnnn for BACKUP/EXTRACT (z/VSE or non-SMS)

LOAD/RETIX parameters

- – KBYTES=1641,OPTIMIZE=YES
- – SORT=#*indexentries* (SORT=1 for z/VSE)
- – SORTDFT (new in 14.0 – brilliant if used wisely)
- – OPTION1='(I)' and review sort messages

TUNE IN NEXT WEEK....

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