

REDCENTRIC

A teal background with several dandelion seed heads in various stages of blowing, some in sharp focus and others blurred in the foreground and background.

BUSINESS TECHNOLOGY. MANAGED.

CTC07W2:
PERFORMANCE TUNING IN THE “REAL WORLD”
PART 2

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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Owen is a technical consultant specialising in the CA Datacom and CA Ideal product families. He started working with the products in 1986 as a programmer, Database Administrator, and Systems Programmer at a VSE site. For 10 years he was a Technical Consultant at CA and became a member of the CA Datacom European Product Specialist group.

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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NOW WHERE
WERE WE?...

DBUTLTY TUNING (RECAP)

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

DBUTLTY TUNING

DBUTLTY HAS MANY RECENT ENHANCEMENTS/OPTIONS

Replace most RETIX with DEFrag

- DEFrag is online activity and is often faster
- Does not consolidate IXX Levels

Use FIRSTKEY/LASTKEY on EXTRACT where appropriate

INIT IXX OLDEP=NO

DBIN1PR / SYSIN1ST to apply default/overrides

DBUTLTY tuning saved several elapsed hours from many jobs

- Simple changes 1hr+ saved from overall batch critical path

SQL TUNING TIPS

SIMPLE WHERE CLAUSE PREDICATE TIPS

IN vs. OR

- WHERE CAT_TYPE IN('05','07')
- WHERE CAT_TYPE = '05' OR CAT_TYPE = '07'
- Usually OR is better

OR vs. BETWEEN

- WHERE CAT_TYPE IN('05','06','07')
- WHERE CAT_TYPE = '05' OR CAT_TYPE = '06' OR CAT_TYPE = '07'
- WHERE CAT_TYPE BETWEEN '05' AND '07'
- Usually BETWEEN is better

SQL TUNING TIPS

SQL QUERY OPTIMISATION HOUSEKEEPING

Index cardinality stats and Row Counts

- RETIX DBID=100,KEYNAME=*SETR
- REPORT AREA=IXX,DBID=100,TYPE=G,UPDATE=YES
- Don't forget UAT environments
- Especially if refreshed using DASD utilities

SYSMMSG enhancements

- Much easier to understand
- Predicate messages no longer “lost” in PXX

DATA REPORTER SIMPLE TABLE EXTRACT

```
OPTION LIST ON DBCOMM=AUTO WRITE ONLY BLOCKED 499
      USER 'DATA MANAGEMENT'
DBFILE: INPUT DATACOM RECORD=356  NAME=F08
      DBID EQ 427
      DEFINE COMMAND          001-005  X
      DEFINE KEY              006-010  X
      DEFINE ELM1             191-196  X  'E9999 '
      DEFINE ELMEND           197-202  X  '      '
      COPYDD CWS-GDSI-AUD CWS-GDSI-AUD PROD USE ENTITY
LSTART: MOVE 'GETIT' TO COMMAND
      MOVE 'K0080' TO KEY
      MOVE 'E9999' TO ELM1
      MOVE '      ' TO ELMEND
      GET DBFILE
      GOTO EOJ WHEN  DBFILE  EQ END-OF-FILE
      GOTO TEST
      SELECT ALL
      FORMAT          CWS-GDSI-AUD
      END
```

DATA REPORTER TUNING

DEFAULT OPTIONS ARE NOT EFFICIENT

In report syntax OPTION card Change BLOCKED 499 to optimum blocking factor for 3390

- INTEGER(27998/ROW-LENGTH)

In CUSMAC(DRDLIMOD) code

- DBGETBLK=61440, (Default is 4K)
- DBSEQBUFS=32, (Default is 2)

Observed elapsed time saving ~30%

URT PRIORITY

DOES IT STILL REALLY MATTER? IN A BUSY MUF, YES!

MUF BREAK parameter will influence effectiveness

What to specify:

Hot CICS AORs and Hot Trusted Server: 12

Normal CICS AORs and Trusted Server: 10

Hot batch (Time-sensitive or Critical Path): 8 or 9

Normal batch: 7 (CA Default)

DataQuery CICS AORs and Ad-hoc Server: 5

DataQuery batch, DBSQLPR and DataReporter: 3

BREAK PARAMETER

NUMBER OF BUFFER REFERENCES BEFORE TASK IS RESCHEDULED

CA supplied start-up parms has BREAK 50

Documentation suggests value 15-25

Maybe on an IBM 4381, but not now!

Uniprocessor (or z/VSE) BREAK 200

Multiprocessor with SMPTASK and zIIP BREAK 500

```
SELECT S.DB_REQUESTS, I.BREAKS_DONE,  
       CAST(I.BREAKS_DONE * 100.00 / S.DB_REQUESTS AS NUMERIC(5,2)) AS PERCENT  
FROM SYSADM.MUF_SYSTEM_STATS S, SYSADM.MUF_INTERNAL_STATS I  
WHERE S.MUF_NAME = I.MUF_NAME
```

Aim for <3% ratio

OVERLAPPING KEYS

Typically Group field and its children specified in key by mistake

- Key should be Group field OR its children

Performance degradation:

- Each key entry twice as long as needed, so fewer in each IXX block
- RETIX/LOAD SORT record length longer - wasted DASD
- CBS or SQL optimizer "confusion"
- IXX dataset twice as large as needed

CA-Supplied demo database 10 has this fault!

OVERLAPPING KEYS

HOW TO FIND THEM

```
SELECT DBID, TABLE_NAME, KEY_NAME, FIELD_OFFSET, COUNT(*)  
FROM SYSADM.DIR_KEY_FIELD  
GROUP BY DBID, TABLE_NAME, KEY_NAME, FIELD_OFFSET  
HAVING COUNT(*) > 1;
```

Watch out for any RAAT (GSETL/REDK*/RDUK*) applications that might be sensitive to the key length change

MONITORING AND HOUSEKEEPING

SYSVIEW EXTENSIONS

BEYOND THE DELIVERED PRODUCT

Very easy to call Sysview from Rexx

Powerful tool for monitoring and managing Datacom

- Replaced IPCP with Rexx->Sysview exec
- Use XVESTRAC to extract Sysview data values
 - Data formatting
 - Protects from release upgrades to DSTs and Sysview

User-defined Line commands

- Very easy to code/implement
- Let's share some examples
- LISTLCMD RELOAD to refresh on the fly

LINECMDS EXAMPLES

Command.	Linecmd.	Min	CmdString.....
CPU	PSW	3	CMD DUMP &F_EXOPSW34 &F_PJobName
CPU	HIStory	3	CMD PLOTLOG NAME CPU%LPAR;+ SELECT ARGUMENT EQ &F_Type
CSFTABLE	DISable	3	CMD CONFIRM URT=&F_URT + TBL=&F_Table + DB=&F_DBID;MVS F &JOBNAME,DBOC + CLOSE=&F_URT&+ DISABLE=&F_URT..&F_Table..&F_DBID&+ AUTO=&F_URT;WAIT 1;REFRESH
CSFTABLE	ENABle	3	CMD MVS F &JOBNAME,DBOC + CLOSE=&F_URT&+ ENABLE=&F_URT..&F_Table..&F_DBID&+ AUTO=&F_URT;WAIT 1;REFRESH

LINECMDS EXAMPLES (CONTINUED)

```
CSFURTS  AUTOo          3  CMD CONFIRM URT=&F_URT ;+  
                          MVS F &JOBNAME, DBOC CLOSE=&F_URT &+  
                          AUTO=&F_URT ; WAIT 1 ; REFRESH
```

```
CSFURTS  NEWcopy       3  CMD CONFIRM URT=&F_URT ;+  
                          MVS F &JOBNAME, DBEC +  
                          PERFORM, CLOSE, URT (&F_URT) ;+  
                          MVS F &JOBNAME, DBEC +  
                          PERFORM, NEWCOPY, URT (&F_URT) ;+  
                          MVS F &JOBNAME, DBEC +  
                          PERFORM, AUTO, URT (&F_URT)
```

```
CSFURTS  REStart      3  CMD CONFIRM URT=&F_URT ;+  
                          MVS F &JOBNAME, DBOC RESTART=&F_URT
```

LINECMDS EXAMPLES (CONTINUED)

DCACCESS CLOse	3	CMD MVS F &JOBNAME,CLOSE &F_DBID
DCACCESS DIR	3	CMD RXDISP DASHBORD DCDIR + DBID &F_DBID
DCACCESS OFF	3	CMD MVS F &JOBNAME,+ ACCESS OFF,&F_DBID
DCACCESS MAInt	3	CMD MVS F &JOBNAME,+ ACCESS MAINT,&F_DBID
DCACCESS NOMaint	3	CMD MVS F &JOBNAME,+ ACCESS NOMAINT,&F_DBID
DCACCESS REAd	3	CMD MVS F &JOBNAME,+ ACCESS READ,&F_DBID
DCACCESS WRItE	3	CMD MVS F &JOBNAME,+ ACCESS WRITE,&F_DBID

LINECMDS EXAMPLES (CONTINUED)

DCACNT	CLOse	3	CMD MVS F &JOBNAME,+ ACCT CLOSE &F_TABLE
DCACNT	OPEn	3	CMD MVS F &JOBNAME,+ ACCT OPEN &F_TABLE
DCACNT	SPILL	3	CMD MVS F &JOBNAME,+ ACCT SPILL &F_TABLE
DCDBASES	DIR	3	CMD RXDISP DASHBORD DCDIR + DBID &F_DBID
DCDBASES	Keys	1	CMD DCKEYS &F_DBID

LINECMDS EXAMPLES (CONTINUED)

DCDSETS	Browse	1	CMD BROWSE '&F_Dataset-Name'
DCDSETS	Tables	1	CMD DCTABLES &F_DBID;+ SELECT AREA EQ &F_AREA
DCINDEX	Dsets	2	CMD DCDSETS &F_DBID;+ SELECT AREA EQ &F_AREA
DCINDEX	Keys	1	CMD DCKEYS &F_DBID
DCLIST	ACcEss	3	CMD DATACOM &F_NAME;LINK DCACCESS
DCLIST	OPEn	3	CMD DATACOM &F_NAME;LINK DCOPEN

LINECMDS EXAMPLES (CONTINUED)

DCOPEN	ACTivity	3	CMD ACTIVITY &F_JOBNAME
DCOPEN	ACCess	3	CMD DCACCESS &F_DBID
DCOPEN	AUTOo	3	CMD CONFIRM CICS URT=&F_URTRnum in + &F_JOBNAME;MVS F &F_JOBNAME,DBOC + CLOSE=&F_URTRnum&AUTO=&F_URTRnum
DCOPEN	DIR	3	CMD RXDISP DASHBOARD DCDIR + DBID &F_DBID
DCOPEN	JOBsum	3	CMD JOBSUM &F_JOBNAME
DCOPEN	URT	3	CMD REXX DCCSFURT &F_JOBNAME &F_URTRnum

LINECMDS EXAMPLES (CONTINUED)

```
DCRCOPT  BUF          3  CMD MVS F &JOBNAME,+
          RCERROR YES,YES,&F_ExtRC&F_IntRC

DCRCOPT  ML           2  CMD MVS F &JOBNAME,+
          RCERROR YES,NO,&F_ExtRC&F_IntRC

DCRCOPT  NOne         2  CMD MVS F &JOBNAME,+
          RCERROR NO,NO,&F_ExtRC&F_IntRC

DCRETCOD RCOpt       2  CMD DCRCOPT;SELECT ExtRC = +
          &F_ExtRC AND IntRC = &F_IntRC
```

LINECMDS EXAMPLES (CONTINUED)

```
DCTASKS  ACTivity      3  CMD ACTIVITY &F_JOBNAME
DCTASKS  CTasks       2  CMD CICS &F_JOBNAME;LINK CTASKS
DCTASKS  DIR           3  CMD RXDISP DASHBOARD DCDIR +
                        DBID &F_DBID
DCTASKS  JOBsum       3  CMD JOBSUM &F_JOBNAME
DCTASKS  SCancel     2  CMD CONFIRM Datacom Server Session +
                        &F_OptionalId;+
                        MVS F &F_JOBNAME,CANCEL=&F_OptionalId
```

LINECMDS EXAMPLES (CONTINUED)

```
DCTRACE REQuest      3  CMD REXX DCDMPREQ &F_TaskNum +  
                        &F_RequAddr
```

```
DCTRACE WORKarea    3  CMD REXX DCDMPREQ &F_TaskNum +  
                        &F_WorkAddr
```

```
DTRACEB DUMp        3  CMD DUMP &F_DXX/Data
```

REXX COMMAND SUBROUTINE DCCSFURT

```
/*REXX exec required to resolve mismatch between  
  formatting of URT number */
```

```
PARSE ARG p_cicsname p_urtnum
```

```
  p_urtnum = right(p_urtnum,4,'0')
```

```
  cmdstring = 'CSFURTS;CICS' p_cicsname || ,  
             ';SELECT URT EQ' p_urtnum
```

```
EXIT cmdstring
```

REXX COMMAND SUBROUTINE DCDMPREQ

```
/*REXX exec to switch to the application address space  
for the selected Datacom MUF task and then display  
storage at the requested address within that  
application address space. Note that in order to use  
this exec properly, you will need to issue command  
SET MEMSWTRETURN YES to update your user profile. */
```

```
PARSE ARG p_TaskNum p_Address
```

```
Address 'SYSVIEWE'
```

```
'C(DCTASKS;SELECT TaskNum EQ' p_TaskNum') STACK(NO)'
```

```
MufName = Word(SYSV_MESSAGE,7)
```

```
'C(XVEXTRAC DATA Jobname S_Jobname) STACK(NO)'
```

REXX COMMAND SUBROUTINE DCDMPREQ (CONTINUED)

```
If S_Jobname.0 == 1 then do
```

```
  'C(ASID' S_Jobname.1' Query) STACK(NO) '
```

```
  cmdstring = 'DUMP' p_Address', 'word(SYSV_MESSAGE, 6)
```

```
End
```

```
Else cmdstring = 'ECHO Task is no longer active in' MufName
```

```
'C(END) '
```

```
EXIT cmdstring
```

X_MSB_MSGS YES

MUF START-UP PARAMETER

DB00813I - ELAPSED SECONDS 120 CPU SECONDS 220.04

DB00814I - RQ/E 32682 RD/E 427 WR/E 5 IX/E 20658 DX/E 52738 DT/E 15525

DB00815I - RQ/C 17823 RD/C 233 WR/C 3 IX/C 11266 DX/C 28761 DT/C 8467

DB00816I - RQ 3921935 RD 51319 WR 685 IX 2479047 DX 6328652 DT 1863094

Allows historical analysis of MUF peak processing periods

Not bad for a machine capped at 26 MSUs

CBS HEURISTICS

MUF START-UP PARAMETER CBS.....1006

If CBS database (006) is not Virtual, it should be!

- VIRTUAL 006,70M

If CBS database is Virtual, CBS Heuristics should be enabled

- CBS 6,2M,0,0,16,**1006**

Housekeeping to eliminate data for old Ideal program versions

```
SELECT DISTINCT 'DELETE FROM CACBSHEURISTIC WHERE CBS_USERID LIKE ''' ||  
    SUBSTR(CBS_USERID,1,22) || '%';'  
FROM SYSADM.CACBSHEURISTIC T1  
WHERE SUBSTR(T1.CBS_USERID,9,1) = '.'  
    AND SUBSTR(T1.CBS_USERID,18,1) = '('  
    AND SUBSTR(T1.CBS_USERID,22,2) = ') '  
    AND SUBSTR(T1.CBS_USERID,1,22) NOT IN  
    (SELECT MAX(SUBSTR(T2.CBS_USERID,1,22))  
    FROM SYSADM.CACBSHEURISTIC T2  
    WHERE SUBSTR(T2.CBS_USERID,1,18) = SUBSTR(T1.CBS_USERID,1,18))
```

Feed the result set into DBSQLPR to delete the obsolete rows

AUTOSCOPE TOOLSET (Z/OS ONLY)

NEW DBUTLTY FUNCTIONS AND DATABASES

AUTOSTATUS

- Great for identifying historical events
- Great for identifying contentions – generating email to DBA
- Great for confirming when the problem was NOT in Datacom

FUNCTION=AUTOSTAT

MUFNAME=PMUF00

OUTTAG=SNAPSHOT

REPEATS=00300

SNAPEXCL=NOTACTIVE

SNAPEXCL=WARNMSG

SNAPEXCL=HEADER

AUTOCOLLECT

- Historical PXX shapshot capture and deltas
- Business value metrics
- Sessions are available for more detail

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REVIEW SVC DUMP CAPTURE PARAMETERS

FASTER PROBLEM RESOLUTION

Used when MUF is “hung” or “looping”

- SYS1.PARMLIB(IEADMCxx)

Datacom dataspace implementation has changed between 11.0, 12.0 and again with 14.0

```
/* FUNCTION: IEADMCPM IS A SAMPLE PARMLIB MEMBER USED TO DUMP */
/* CA-DATACOM MUF AND ASSOCIATED DATASPACE/SERVER/CICS */
/* ----- */
/* INSTRUCTIONS TO USE: */
/* 1. TO TAKE A DUMP, ISSUE THE OPERATOR COMMAND: */
/* DUMP COMM=(TITLE),PARMLIB=XX */
/* I.E. DUMP COMM=(PM ADDRESS SPACES),PARMLIB=PM */
JOBNAME=(PMUF*,PSRV00,PCICS*),
DSPNAME=('CAMASTER'.*),
SDATA=(RGN,XESDATA,ALLNUC,CSA,LSQA,PSA,SQA,SUM,SWA,TRT,WLM)
```

Adjust to include Shadow/MUFPLEX mufs

SAMPLE BACKGROUND TASKS

JANUARY 2013-AUGUST 2014

Replace IPCP software with Sysview/Rexx application (Saving £1300 p.a.)

Removal of redundant Housekeeping jobs from schedule

Remove redundant Datacom Tables

Amend Datacom MEMLIMIT from 4G to 5G

Implement zIIP processing for SYSVIEW

UAT Datacom start-up options tuning

Datacom 14.0 rollout UAT

Increase Datacom primary data buffer size

OA's making many DBUTLTY changes adding region 0M

Datacom 14.0 upgrade to production

MSU's reduced from 37 to 26 during this period (£750 p.m. saving for each MSU reduced)

Mainframe TCO savings £9,350 (~ \$14,200) per month

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THE BIG WIN!

SEPTEMBER 2014 REVIEW

Mainframe no longer highest TCO server

Mainframe migration/decommissioning budget cancelled

Some tables/applications from other high-cost servers now moving to mainframe

Mainframe now considered equally for some application development

A big success, but we know that there is much more we can do to optimize the mainframe estate.

The difference is that now management believe us.

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THANK YOU

ANY QUESTIONS?

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