

DB2 Server for VSE&VM - Tidbits

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Agenda



- ◆ Usability
- ◆ Availability
- ◆ Serviceability

Usability

- ◆ Database replication utility
- ◆ SHOW DBCONFIG
- ◆ SHOW SQLDBGEN
- ◆ Release empty pages
- ◆ DBNAME Directory restructuring
- ◆ NDIRBUF & NPAGBUF while running in SUM

Database replication utility

- ◆ SQLDBDEF utility written in REXX
- ◆ A DBA's tool
- ◆ Information to recreate database objects
 - DBSPACE, TABLE, KEYS, VIEWS, SYNONYMS, INDEXES
- ◆ NOT for system tables and DBSPACEs
- ◆ run after major changes made to a database object
- ◆ Loads of information

Database replication utility continue...

In SYSLST:

```
// JOB GETASSN                                DATE 03/19/2004
// LIBDEF PROC,SEARCH=PRD2.DB2730
// EXEC REXX=SQLDBDEF,
      PARM='DB(GHINDB) ID(SQLDBA) PW(SQLDBAPW) TARGET(VSE) DBSPACES(63)
          STOREDPROCS(NO) GRANTS(NO) '
ARI2921I The SQLDBDEF utility was invoked as follows:
ARI2922I Using the following parameter values:
ARI2922I  DBNAME              (GHINDB              )
ARI2922I  ID                  (SQLDBA              )
ARI2922I  PW                  (SQLDBAPW           )
ARI2922I  TARGET              (VSE                 )
ARI2922I  GRANTS              (NO                  )
ARI2922I  SPS                 (NO                  )
ARI2922I  OWNER               (                    )
ARI2922I  DBSPACES            (63                  )
ARI2922I  AUTH                (YES                 )
ARI2922I  NOPRINT             (                    )
ARI2923I Running ARIDBDEF to generate:
```

Database replication utility continue...

In SYSLST: (continue...)

```
ARI2923I   - SQL statements to recreate all objects in dbspace 63
ARI2933I SYSOPTIONS option CHARSUB has value SBCS in the source table.
ARI2933I SYSOPTIONS option CHARNAME has value INTERNATIONAL in the source table
...
ARI2924I Processing DBSPACE PUBLIC.ASSNMST
ARI2924I Processing TABLE GHINDB.ASSN_ADDR
ARI2932I Column AS_REC_KEY uses CCSID 500 and subtype S in the source table
...
ARI2932I Column AS_YEAR_RND uses CCSID 500 and subtype S in the source table.
ARI2924I Processing TABLE AUTHORITIES
ARI2924I Processing KEY PKEYCZ1M9Y9VNDPX
...
ARI2924I Processing KEY FKEYCZ1M76WHTG1K
ARI2924I Processing INDEX SQLDBA.I_ASSN_ADDR
...
ARI2924I Processing INDEX SQLDBA.I_ASSN_SUB
ARI2924I Processing VIEW GHINDB.V_ASSN_ADDR
...
ARI2924I Processing SYNONYMS

ARI2928I All ARIDBDEF processing completed successfully.
1S55I LAST RETURN CODE WAS 0000
```

Database replication utility continue...

In SYSPCH:

```
CONNECT SQLDBA IDENTIFIED BY <PW> TO <TARGETDB>;
SET ERRORMODE CONTINUE;

COMMENT '*****'
COMMENT '* Acquiring dbspace *'
COMMENT '*****'
ACQUIRE PUBLIC DBSPACE NAMED "ASSNMST" (PAGES=115200,PCTINDEX=20,
PCTFREE=15,NHEADER=8,LOCK=ROW);

COMMENT '*****'
COMMENT '* Creating tables and table privileges *'
COMMENT '*****'
CREATE TABLE "GHINDB"."ASSN_ADDR" ("AS_REC_KEY" CHAR (3) NOT NULL
,"AS_ASSOC" CHAR (2) NOT NULL,"AS_SUB_ASSOC" CHAR (1) NOT NULL
,"AS_TYPE" SMALLINT NOT NULL,"AS_STREET1" CHAR (30),"AS_STREET2" CHAR
(30),"AS_CITY" CHAR (18),"AS_STATE" CHAR (2),"AS_ZIP" DECIMAL ( 5, 0)
,"AS_COUNTRY" CHAR (3)) IN "ASSNMST";
...
ALTER TABLE "GHINDB"."ASSN_SUB" ADD PRIMARY KEY ("AS_REC_KEY");
ALTER TABLE "GHINDB"."ASSN_ADDR" ADD FOREIGN KEY "FKEYCZ1M76TLOONV" (
"AS_REC_KEY") REFERENCES "GHINDB"."ASSN_MASTER" ON DELETE CASCADE;.
...
```

Database replication utility continue...

In SYSPCH: (continue...)

```
CREATE INDEX "SQLDBA"."I_ASSN_SUB" ON "GHINDB"."ASSN_SUB" ("AS_ASSOC",  
"AS_SUB_ASSOC") PCTFREE= 10;
```

```
COMMENT '*****'  
COMMENT '* Creating views *'  
COMMENT '*****'  
CREATE VIEW "GHINDB"."V_ASSN_ADDR" .V_ASSN_ADDR AS SELECT *  
FROM GHINDB .ASSN_ADDR ;  
CREATE VIEW "GHINDB"."V_ASSN_MASTER" .V_ASSN_MASTER AS SELECT  
* FROM GHINDB .ASSN_MASTER ;  
CREATE VIEW "GHINDB"."V_ASSN_REV" .V_ASSN_REV AS SELECT *  
FROM GHINDB .ASSN_REV ;  
CREATE VIEW "GHINDB"."V_ASSN_SUB" .V_ASSN_SUB AS SELECT *  
FROM GHINDB .ASSN_SUB ;
```

```
COMMENT '*****'  
COMMENT '* Creating synonyms *'  
COMMENT '*****'
```

```
COMMIT WORK;
```


SHOW DBCONFIG

- ◆ Has been changed -
 - current version, release and modification level
 - version, release and modification level DB genned

CURRENT SYSTEM IDENTIFICATION = DB2 VSE & VM 7.3

SYSTEM IDENTIFICATION AT DB GENERATION = DB2 VSE & VM 7.1

SHOW SQLDBGGEN

- ◆ Another DBA tool
- ◆ Displays the current database configuration
- ◆ A DB2 operator command, output on console/ISQL only
- ◆ Capture output to use in ARISDBG.A or SQLDBGGEN A file
- ◆ Includes the current INTERNAL DBSPACE specification - no guess work

SHOW SQLDBGEN

Sample display from SHOW SQLDBGEN:

The current DB definitions are

CUREXTNT=22

MAXPOOLS=128

MAXEXTNT=256

MAXDBSPC=512

END

Non-recoverable storage pools:

POOL 4 NOLOG

END

Storage pool assignments:

1 1

2 2

...

22 11

END

Current DBSPACES:

PUBLIC 12800 1

PUBLIC 2048 2

SHOW SQLDBGEN

Sample display from SHOW SQLDBGEN: (continue...)

```
...  
PUBLIC 46080 5  
PUBLIC 92160 5  
PUBLIC 163840 5  
PUBLIC 204800 5  
PUBLIC 128 6  
PUBLIC 128 6  
...  
PRIVATE 1280 2  
PRIVATE 1280 2  
Internal DBSPACES:  
INTERNAL 32 25600 4  
END
```

```
ARI0065I Operator command processing is complete.
```

Release empty pages

- ◆ Another DBA tool
- ◆ New database start up option STARTUP=P (SQLRELEP EXEC)
- ◆ Runs in Single User Mode (SUM)
- ◆ Release EMPTY instead of DROP DBSPACE which may cause Short On Storage (SOS)
- ◆ not capturing the changes on the LOGDSK, user *must* ARCHIVE before and after the run
- ◆ HIPER APAR PQ75819

DBNAME Directory restructuring

- ◆ Major restructuring in Version 7
- ◆ Exceed 80 bytes
- ◆ Uses REXX procedure to reconstruct it
- ◆ produces 2 DBNAME Directory PHASEs
 - ARICDIRD - online
 - * cannot reload using CEMT new
 - ARICDBND - batch

NDIRBUF & NPAGBUF while running in SUM

- ◆ Database manager would only work on data already in buffers
- ◆ The more buffer the better performance (better “buffer hit ratio”)
- ◆ But, the number of buffer does NOT make a difference while running in SUM
- ◆ Single threaded
- ◆ the performance is based on how fast the DASD and tape I/Os are

Availability

- ◆ Alternate logging support
- ◆ TCP/IP Auto-Restart & Retry
- ◆ TCP/IP Dispatcher Bias.

Alternate logging support

- ◆ A step closer to 24x7
- ◆ It works but with minor problems: ABTERM CODE 020 in module ARIYI00
- ◆ PMR 21627,278,000. FIXTEST is available for verification
- ◆ Switch is automatic, use LARCHIVE INACTIVE to archive the inactive log disk
- ◆ Forced to ARCHIVE both log disks when switching takes place but the inactive log has not been archived.

Alternate logging support continue...

◆ Activating ALTLOG support:

Note: not clearly documented in Sys. Admin.

- ARCHIVE database and IDCAMS BACKUP LOGDSK1
- IDCAMS DEFINE alternate log with same size as LOGDSK1.
- Add DLBL info to DB label PROC:

```
// DLBL ALTLGD1,'DB2.ALTLOG1',,VSAM,CAT=UCATDB
```
- COLDLOG RECONFIGURE with

```
LOGMODE=Y, ALTLOG=Y, STARUP=L, SYSMODE=S
```
- Startup database server with **LOGMODE=L** and **ALTLOG=Y**

Alternate logging support continue...

◆ Deactivating ALTLOG support

Note: NOT being documented at all in any manuals

- Make sure that the LOGDSK1 is the active log, else abend ARIYL13 09 when COLDLOG the database
- ARCHIVE database and IDCAMS BACKUP LOGDSK1 & ALTLDG1
- Remove **ALTLGD1** DLBL info from DB label PROC:
- COLDLOG RECONFIGURE with
LOGMODE=Y, **ALTLOG=N**, STARUP=L, SYSMODE=S
- Startup database server with **LOGMODE=L|A|Y** and **ALTLOG=N**

Alternate logging support continue...

◆ ALTLOG in action:

```
...
FA 0010 ARI2052I A CHECKPOINT WAS TAKEN.  TYPE = LOG ARCHIVE STARTED
                SCHEDULED:  00:09:54 STARTED:  00:09:54 ENDED:  00:10:04
FA 0010 ARI2059I SWITCHING THE ACTIVE LOG FROM LOGDSK1 TO ALTLGD1 HAS BEGUN.
FA 0010 ARI2060I SWITCHING THE ACTIVE LOG FROM LOGDSK1 TO ALTLGD1 COMPLETED.
FA 0010 ARI2052I A CHECKPOINT WAS TAKEN.  TYPE = LOG ARCHIVE COMPLETED
                SCHEDULED:  00:09:54 STARTED:  00:10:04 ENDED:  00:10:05
FA 0010 ARI2052I A CHECKPOINT WAS TAKEN.  TYPE = PERIODIC
----- snipped -----
FA 0010 ARI2052I A CHECKPOINT WAS TAKEN.  TYPE = PERIODIC
                SCHEDULED:  02:33:58 STARTED:  02:33:58 ENDED:  02:34:02
FA 0010 ARI2061E SWITCH TO INACTIVE LOG CANNOT OCCUR - INACTIVE LOG
                HAS NOT BEEN ARCHIVED.
FA 0010 ARI2062I THE DATABASE MANAGER IS INITIATING A LOG ARCHIVE OF
                THE INACTIVE LOG.
FA 0010 ARI0293I ARCHIVE IS STARTING.
```

Alternate logging support continue...

◆ ALTLOG in action (continue...)

```
FA 0010 ARI0239I EXTERNAL LABELING OF THIS ARCHIVE IS:
FA 0010                TYPE:          LOG  ARCHIVE
FA 0010                TIMESTAMP: 01-10-04  02:38:04
msg fa,data=show log
FA 0010 LOG STATUS:
FA 0010    ACTIVE LOG: ALTLGD1
FA 0010    INACTIVE LOG: LOGDSK1 , IS NOT ARCHIVED.
FA 0010    LOG SIZE IS 1474367488 BYTES.
FA 0010    LOG USED IS 80 PERCENT 1180689053 BYTES.
FA 0010    ARCHIVING IS TAKING PLACE.
FA 0010 ARI0065I OPERATOR COMMAND PROCESSING IS COMPLETE.
FA 0010 ARI0292I ARCHIVE IS COMPLETED.
FA 0010 ARI2063I THE DATABASE MANAGER IS INITIATING A LOG ARCHIVE OF
                THE ACTIVE LOG.
```

Alternate logging support continue...

◆ ALTLOG in action (continue...)

```
FA 0010 ARI0257I NEW LUWS AND THE LOG ARCHIVE OF THE ACTIVE LOG
          CANNOT CONTINUE UNTIL 1 NON-R/O ACTIVE LUWS
          ARE COMPLETED.

FA 0010 ARI0293I ARCHIVE IS STARTING.
FA 0010 ARI0239I EXTERNAL LABELING OF THIS ARCHIVE IS:
FA 0010          TYPE:          LOG ARCHIVE
FA 0010          TIMESTAMP: 01-10-04  11:10:24
FA 0010 ARI2052I A CHECKPOINT WAS TAKEN.  TYPE = LOG ARCHIVE STARTED
          SCHEDULED:  02:38:04 STARTED:  11:00:37 ENDED:  11:16:28
FA 0010 ARI0292I ARCHIVE IS COMPLETED.
...

```

Alternate logging support continue...

◆ In the LOGHIST

```
FA 0010   CREATED LAST DATABASE ARCHIVE ON 01-09-2004 AT 21:33:16  
FA 0010   AT ENTRY 2.
```

```
FA 0010
```

```
FA 0010   ENTRY TYPE                DATE                TIME  
FA 0010 LOGMODE L                   01-09-2004         21:33:44
```

```
FA 0010 USER DB ARCH CREATED         01-09-2004         21:33:16
```

```
FA 0010 LOG ARCH CREATED              01-09-2004         11:20:31
```

```
FA 0010 LOG SWTCH - ALT TO PRI        12-31-2003         18:04:00
```

```
FA 0010 LOG ARCH CREATED              12-31-2003         10:38:20
```

```
FA 0010 LOG SWTCH - PRI TO ALT        12-30-2003         23:08:21
```

```
FA 0010 USER DB ARCH CREATED         12-24-2003         11:31:34
```

```
FA 0010 LOG ARCH CREATED              12-24-2003         11:28:40
```

```
FA 0010 LOGMODE L                   12-23-2003         20:27:39
```

```
FA 0010 USER DB ARCH CREATED         12-23-2003         19:04:03
```

```
FA 0010 COLDLOG RECONFIG              12-23-2003         17:13:43
```

```
FA 0010 ARI0065I OPERATOR COMMAND PROCESSING IS COMPLETE.
```

TCP/IP Retry & Auto-Restart

- ◆ TCPRETRY=Y|N
- ◆ TCPMAXRT=158

...

```
C1 0045 ARI4115I TCP/IP SUPPORT FOR THE DATABASE MANAGER IS DISABLED.
```

```
C1 0045 ARI4116I TCP/IP AUTOMATIC RESTART BEGINS. ATTEMPT = 1
```

```
C1 0045 ARI0016I TCPPORT PARAMETER VALUE IS 4865.
```

```
C1 0045 ARI0065I OPERATOR COMMAND PROCESSING IS COMPLETE.
```

```
C1 0045 ARI4103I TCP/IP SERVICE GETHOSTBYADDR FAILED.
```

```
RETURN CODE = 1117
```

```
C1 0045 ARI4102I UNABLE TO INITIALIZE TCP/IP SERVICE.
```

```
C1 0045 ARI4117E TCP/IP AUTOMATIC RESTART ATTEMPT 1 FAILED.
```

```
157 ATTEMPTS REMAINING.
```

```
C1 0045 ARI4116I TCP/IP AUTOMATIC RESTART BEGINS. ATTEMPT = 2
```

```
C1 0045 ARI0016I TCPPORT PARAMETER VALUE IS 4865.
```

```
C1 0045 ARI0065I OPERATOR COMMAND PROCESSING IS COMPLETE.
```

```
C1 0045 ARI4100I TCP/IP SERVICE INITIALIZED FROM DBNAME DIRECTORY.
```

```
TCP/IP PORT IS 4865.
```

...

TCP/IP Dispatcher Bias

- ◆ Two “wait agents” (dispatchers):
 - OPERATOR - VSE WAITM macro
 - TCPIP - SELECTEX() waits
- ◆ TCPDISPB=nn
 - where: ‘nn’ is a counter
 - after ‘nn’ times OPERATOR agent waits, then allows TCPIP agent to wait
- ◆ A way to balance respond time between local and remote users
- ◆ Turn off TCP/IP when running batch at night

Serviceability

- ◆ FFDC DUMP
- ◆ SHOW CONNECT
- ◆ Presenting problem to DB2/VSE&VM Service Team

FFDC DUMP

- ◆ First Failure Data Capture DUMP

- ◆ // ASSGN SYS098,SYSLST

Note: SYS097 should be assigned to SYSPCH for Stored Procedure Support.

- ◆ When happens, DB/2 server pauses while capturing the FFDC DUMP

- ◆ Usually, the FFDC DUMP gives you the reason why the dump is being taken

FFDC DUMP continue...

◆ A typical FFDC DUMP

```
##### BEGIN FIRST FAILURE DATA CAPTURE DUMP #####
<<<<< DUMP IDENTIFIER : 20031103110223 >>>>>
APPLICATION SERVER DUMP
LUWID = NO LUWID AVAILABLE DATE/TIME = 2003-11-03 11:02:23
EXTNAM: msqry32.exe 0D500000000.....
REQUESTER: QDB2/NT V . . AT DB2CONNECT
SYMPTOM STRING: MS/ARI2909I PIDS/5697F4201 RIDS/ARITPAS PRCS/23
PROBABLE CAUSE OF FAILURE :
DDM VALUE NOT SUPPORTED
<<<< snipped >>>>
##### REQUEST DATA STREAM #####
037A4370 00000000 0047D041 00010041 106E0006 11A20007 * .....>...s.. *
037A4380 00000010 00162110 C7C8C9D5 C4C24040 40404040 * ....GHINDB *
037A4390 00000020 40404040 4040000D 11A0A685 82A28599 * .....webser *
037A43A0 00000030 A5859900 1411DC18 5F902CC8 4991DFA4 * ver.....^..H.j.u *
037A43B0 00000040 1CD0E264 AA694300 A1D00100 02009B20 * ..S..... *
```

FFDC DUMP continue...

◆ A typical FFDC DUMP (continue...)

```
037A43C0 00000050 01000621 0F240700 172135C8 F4F0F0F0 * .....H4000 *
037A43D0 00000060 F0F4C44B D2F4F0F6 03110316 16540016 * 04D.K406..... *
037A43E0 00000070 2110C7C8 C9D5C4C2 40404040 40404040 * ..GHINDB *
037A43F0 00000080 40404040 000C112E E2D8D3F0 F8F0F1F2 * ....SQL08012 *
037A4400 00000090 000D002F D8E3C4E2 D8D3E7F8 F6000A00 * ....QTDSQLX86... *
037A4410 000000A0 35000611 9C04E400 3C210437 E2D8D3F0 * .....U.....SQL0 *
037A4420 000000B0 F8F0F1F2 D5E34040 40404040 40404040 * 8012NT *
037A4430 000000C0 40404040 404094A2 9899A8F3 F24B85A7 * msqry32.ex *
037A4440 000000D0 85404040 40404040 4040A685 82A28599 * e webser *
037A4450 000000E0 A5850000 05213BF1 * ve.....1 *
```

```
##### END DATA STREAM DUMP #####
```

```
##### END FIRST FAILURE DATA CAPTURE DUMP #####
```

FFDC DUMP continue...

◆ Output from the FFDC DUMP formatter

```
##### REQUEST DATA STREAM #####
FMT->      RQSDSS
FMT->      106E (SECCHK      )
FMT->      11A2 (SECMEC      ) = 0007
FMT->      2110 (RDBNAM      ) = GHINDB
FMT->      11A0 (USRID       ) = webserver
FMT->      11DC (SECTKN      ) = 185F902CC84991DFA41CD0E264AA6943
FMT->      RQSDSS
FMT->      2001 (ACCRDB      )
FMT->      210F (RDBACCCL     ) = 2407
FMT->      2135 (CRRTKN      ) = H400004D.K406" "" "" ?
FMT->      2110 (RDBNAM      ) = GHINDB
FMT->      112E (PRDID       ) = SQL08012
FMT->      002F (TYPDEFNAM    ) = QTDSQLX86
FMT->      0035 (TYPDEFOVR   ) = 0006119C04E4
FMT->      2104 (PRDDTA      ) = "SQL08012NT          msqry32...
                          .exe          webserve"          ...
FMT->      213B (TRGDFTRT   ) = F1
```

- USERID is more than 8 Characters.

SHOW CONNECT

- ◆ An excellent problem debugging tool
 - user hung?
 - USER is not processing and is
 - ◆ in communication wait
 - ◆ in I/O wait
 - ◆ waiting for a stored procedure
 - ◆ in a LATCH wait
 - ◆ in a LOCK wait,
 - ◆ etc.
 - State started
 - Conversation started
 - CPU time

SHOW CONNECT continue...

- ◆ An excellent problem debugging tool (continue...)

- Where the user is from?

- CICS: Task No. / RMID / Term. Id
- Remote: LUWID / EXTNAM / Requester /Rmtuser ID / LU name
- Protocol using: Protocol SQLDS|DRDA|DRDA2 via SNA|TCP/IP

- What the user is running?

- Package & Section

Presenting problem to DB2/VSE&VM Service Team

- ◆ Check if it is an existing problem
 - VSE-L
 - <http://www-306.ibm.com/software/data/db2/vse-vm/support.html>
- ◆ Gather information
 - console log with error/abend messages/minidump
 - SYSLST from DB2/VSE server partition
 - SQLCODE/ABEND Code/Module & code
 - MSHP RETRACE DB2/VSE; plus LE, TCP/IP if error in communication

Presenting problem to DB2/VSE&VM Service Team

- ◆ Gather information (continue...)
 - DB2/VSE partition dump
 - Note: in 500 pages segments, zip and email
 - OUTPUT from SHOW INITPARM
 - Application/SQL statement
 - VSE SL/VM PUT level
 - etc.

Bonus Tidbit

- ◆ To improve DB2 performance
 - Update statistics on SYS0001, SYS0002 – SYS000n
 - Periodic SQLCIREO / STARTUP=I
 - Take an database archive first!
 - Use SQLEND DVERIFY – especially before ARCHIVE
 - Periodic UPDATE ALL STATISTIC FOR DBSPACE dbspacename, then
 - REBIND PACKAGES
 - Shot those lousy DB2 application programmers

Resources

- ◆ www.thefillmoregroup.com
- ◆ www.software.ibm.com/data/db2/vse-vm

Thank you!

