DB2 Reference Guide
For
IBM z/OS
Remote Access Programs

11/18/15

by

IBM Innovation Center, Dallas

Index

1 DB2 for z/OS Installation and Configuration....3
2 Dataset Information....3
3 Instructions to start/stop the DB2 subsystem....3
4 Accessing DB2 SPUFI interface and DB2 Products from the host....4
5 Accessing DB2 on the guest z/OS system remotely....5
6 Working with DB2 on z/OS....6
7 DB2 Arclog files....7
8 Deleting DB2 Arclogs....8
9 DB2 Maintenance....11
10 DB2 Utilities....13
11 DB2 Product Tools....13
11.1 Default DB2 product tools....13
11.2 All available DB2 product tools....14
11.3 How to access DB2 product tools....14

DB2 for z/OS is an optional product available upon request for the z/OS remote access environment. Please contact the IBM Innovation Center, Dallas, if you wish to add DB2 to your guest z/OS system.

1 DB2 for z/OS Installation and Configuration

When requested to be connected to the guest z/OS system, DB2 will be installed and configured as documented in the DB2 for z/OS program directory and installation guide, with some minor modifications to conform to IBM Innovation Center, Dallas installation guidelines.

2 Dataset Information

DB2 for z/OS datasets will have the following format and contain information as described below:

- The high level qualifier is DSN*xxx*, with *xxx* representing the version and release of DB2, e.g. DSNA10 or DSNB10. If you have multiple DB2 subsystems of the same version, the high level qualifier could also be DSN*x*20.* where *x* represents the version of DB2.
- The sample installation and IVP jobs are found in library DSN*xxx*.NEW.SDSNSAMP.
- Installation, maintenance information, and configuration samples are provided in datasets named DSN*xxx*.SVSC.*.
- The default DSNZPARMS information is contained in dataset DSN*xxx*.NEW.SDSNSAMP(DSNTIJUZ)

3 Instructions to start/stop the DB2 subsystem

DB2 started tasks are found in dataset VENDOR.PROCLIB and follow a naming standard of DB*x*G*, where *x* is either A(V10) or B (V11) representing the version of DB2.

The following commands can be issued from the LOG display in SDSF. From the TSO Primary Option Menu, type SD.LOG and press ENTER. In the following examples, DB2 V10 is being started. To start DB2, issue the following command:

/-DBAG START DB2

This will start the following tasks associated with DB2:

DBAGMSTR

DBAGDBM1

DBAGIRLM

DBAGDIST

DBAGADMT

To stop DB2 and all associated started tasks, issue the following commands:

/F DBAGADMT,APPL=SHUTDOWN

/-DBAG DIS THD(*) (Use this command to look for active threads)

/-DBAG CANCEL THREAD(xx) where xx is the TOKEN from the display if there are any active threads.

/-DBAG STOP DB2

4 Accessing DB2 SPUFI interface and DB2 Products from the host

The datasets required to access the DB2 interface and DB2 product panels get allocated to your TSO session when you first logon to TSO. Several different TSO logon procs are available to use, depending on what version of DB2 you will be using. When you logon on to TSO, you must specify the correct proc to get the required datasets allocated.

Once logged on to TSO, you can access the DB2I (DB2 Interactive) Primary Option menu by selecting D2 from the ISPF Primary Option Menu (the first screen you see).

Below are the correct logon procs to use. These procs vary depending on the level of z/OS you are running and the version of DB2 you wish to access:

For guest z/OS release 1.13 systems and higher:

DBPROC*ns* - '*n*' represents the version of DB2 you want to use. '*s*' represents the DB2 subsystem identifier (usually G, but could be different if you have multiple DB2 subsystems at the same DB2 version level). For example **DBPROCAG** would be used to access DBAG subsystem and product panels. Also, **DBPROCBG** used to access DBBG.

You can verify the logon procs available on your system by looking in the following PROCLIB datasets (in this order):

1. VENDOR.PROCLIB
2. SVTSC.PROCLIB
3. LVL0.PROCLIB

5 Accessing DB2 on the guest z/OS system remotely

Information needed to access the different levels of DB2.

SSID	Location	TCPIP Port	IP Address
DBAG	DALLASA	5030	xx.xx.xx.xx
DBBG	DALLASB	5035	xx.xx.xx.xx

Following is one way to setup DB2 Connect to the Mainframe. To set up the connection from a distributed platform, execute the following commands from the DB2 Command Line Processor:

db2 CATALOG TCPIP NODE *zseries* REMOTE *hostname* SERVER *db2port#* OSTYPE MVS WITH 'OS/390 Host'

db2 CATALOG DB *dbname* AS *zosloc* AT NODE *zseries* AUTHENTICATION DCS

db2 CATALOG DCS DB *dbname* AS *zosloc* WITH 'OS/390 DB'

Notes:

zseries - your choice of node name for the zSeries on the client

db2port# - tcpip port number assigned to this DB2 subsystem on z/OS (From Delivery Email)

dbname - your choice of database name for this connection

hostname - the existing hostname or IP address of the z/OS system

zosloc - the LOCATION of the subsystem. (From delivery email)

The WITH is an optional parameter in all commands. It can be used to define a description for the catalog entries.

List commands on the client to verify the catalogs:

db2 LIST NODE DIRECTORY

db2 LIST DB DIRECTORY

db2 LIST DCS DIRECTORY

Test the connection by issuing the following command:

db2 CONNECT TO *zosloc* USER *uid* USING *pwd*

Notes:

zosloc - the database name defined previously

uid - RACF userid defined with the appropriate authority.

(cannot start with SQL or SYS)

pwd - password defined for the userid. The USING keyword and password can be omitted from the command and in that case DB2 will prompt for the password.

If you receive error like the the following:

Invocation of routine "SYSPROC .DSNUTILS "failed due to reason "00E79002". SQLSTATE=55023

It means, that the stored procedure cannot be executed, possibly, because of lack of WLM configuration or the WLM is stopped.

6 Working with DB2 on z/OS

Following are some words of advice when creating DB2 for z/OS databases and tables. The proper approach when designing databases, tablespace and tables in z/OS is to follow these steps:

1. Create your own STOGROUP and specify a VCAT name (high level qualifier of your dataset) and also specify the volume(s) you want to use for your application data. You can find volume name information in the delivery email that was sent to the system contact.
2. Create your DATABASE using the above STOGROUP. You do NOT want to create a DATABASE without specifing the STOGROUP, otherwise you will use the default STOGROUP SYSDEFLT.
3. Create separate tablespaces in the above DATABASE for EACH table you want to create. This confi will perform much better for you.
4. Create your table in the above tablespace
5. If you don't specify a database or tablespace, DB2 will create one for you using the DEFAULT database DSNDB04 and default STOGROUP SYSDFELT. This is not recommended.
6. Note if you need more space for application tablespaces you can add volumes ALTER the default STOGROUP SYSDFELT to add volume VPWRKx and add one of your work packs. Use SPUFI to execute the following SQL:

ALTER STOGROUP SYSDEFLT ADD VOLUMES (VPWRKx)

7 DB2 Arclog files

DB2 has active log datasets that ARCHIVE when they get full. The archive task produces archive log datasets that follow a naming standard of DSNx10.DBxG.ARCLOG* (where x represents the version of DB2). The correct thing to do is to be sure that you have a DASD volume with enough space on it, mounted as 'STORAGE' so that DB2 can place it's arclog datasets there.

Check your delivery email for available volumes on your system and the amount of space on them. Below is a sample list of possible available volumes:

VPWRKA (0D30) xxxx cyls

VPWRKB (0D31) xxxx cyls

VPWRKC (0D32) xxxx cyls

VPWRKD (0D33) xxxx cyls

If you wanted to mount VPWRKD as use=storage, you would perform the following steps:

1. Logon to TSO
2. Go into SDSF - option SD from TSO ISPF main menu
3. Type in LOG on the command line and press ENTER
4. On the command line enter **/d u,,,d30,10 (to display these volumes)**
5. On the command line enter **/m d33,vol=(sl,vpwrkd),use=storage**
6. You can then scroll through the LOG output to see the command and the results. Scroll up or down using the F7 or F8 keys
7. To be sure the volume is mounted as storage, enter the following command: /d u,,,d33,1

You will see output from the above command that looks like:

UNIT TYPE STATUS VOLSER VOLSTATE

0D33 3390 A VPWRKD STRG/RSDNT

When you issue these commands manually, they stay in effect for as long as your system is up. When you IPL (SVXLOG) your system, it resets everything. To make this change permanent, you will need to add an entry to member VATLST00 in VENDOR.PARMLIB. Follow these steps:

- Look in VENDOR.PARMLIB for member VATLST00. If you don't see it there, look in SVTSC.PARMLIB then LVL0.PARMLIB.
- Copy VATLST00 from SVTSC.PARMLIB or LVL0.PARMLIB into VENDOR.PARMLIB.
- Add an entry to the bottom of this member that looks like this:

  %PWRKD,0,0,* ,Y WORK VOLUME (% ADDED FOR 3380/3390)
- Press F3 key to save the member.

Even though you have just allocated a volume as storage and your arclog datasets have a place to go, you don't really need to keep the ones that are produced when you run the REBIND job that is part of the DB2 maintenance hold actions(more info about DB2 maintenance is described below). Here is the best way to handle that:

1. Prior to running the REBIND job, be sure that the DB2 subsystem has just been started. If it has been running for a while, stop it and then restart it. For example, you can stop/start DBAG from the SDSF command line:
   - Check for active threads, issue /-DBAG DIS THD(*)

- Terminate any active threads with /-DBAG CANCEL THREAD(xx) where xx is the TOKEN from the display.
- Enter command /-DBAG STOP DB2
- Enter command /F DBAGADMT,APPL=SHUTDOWN
- Enter LOG to view the syslog and watch for message SUBSYSTEM DBAG READY FOR START COMMAND
- Enter command /-DBAG START DB2 and watch syslog for message -DBAG DSNYASCP 'START DB2' NORMAL COMPLETION
- Look at the job output for DBAGMSTR to see if an Archive log was created during startup, if so, stop and start DB2 one more time.

2. When it is completely active - you can SUBmit the REBIND job.
3. While that job is running, it will produce a lot of log records and cause archiving. You can delete these arclog datasets as they are produced. Follow the instruction in the 'Deleting DB2 Arclogs' below.

8 Deleting DB2 Arclogs

The most important thing about deleting a DB2 Archive data sets is to insure DB2 no longer needs the archive data set your going to delete. If you delete an archive data set DB2 still needs; your going to chance corrupting your DB2 data. Also DB2 may not restart if you have deleted an archive log it needs.

If your DB2 locks up because it cannot archive it's logs, It is best to mount a DASD volume (see Chapter 7, step 4) as "storage" to allow DB2 to finish it's archive process before you attempt to delete the archive logs.

The easiest way to insure DB2 no longer needs an archive log is to stop and restart DB2. If DB2 comes back up with no errors or references to an archive log then it should be OK to delete the existing archive logs. If there are any errors or request for an archive log then stop and restart DB2 again.

Note, even though you delete the DSNx10.DBxG.ARCLOG1.Date.Time.A0000000# data sets you need to keep enough of the DSNx10.DBxG.ARCLOG1.Date.Time.B000000# data sets to cover two successful restarts of DB2. These are the backups for your BSDS data sets. If anything happens to your BSDS; you will need the backup to restore your BSDS.

It is much easier to keep track of archive logs if you have the time stamp option turned on. If your archive logs do not have the date/time stamp, change the TSTAMP=NO option in

DSNx10.NEW.SDSNSAMP(DSNTIJUZ) to TSTAMP=YES. Then stop DB2, submit the first two steps of that job, check to insure it completes successfully and restart DB2. In more current releases of z/OS, this has already been done.

Once you have determined it is OK to delete an archive log, you can go to ISPF 3.4 and take the following action:

Select all the archive logs for DBAG by entering DSNA10.DBAG.ARC* in the following display.

```
                          Data Set List Utility
Option ===>

   blank Display data set list               P Print data set list
       V Display VTOC information           PV Print VTOC information

Enter one or both of the parameters below:
   Dsname Level . . . DSNA10.DBAG.ARC*
   Volume serial  . .
```

Data Set List Utility

This should show you a list similar to the following display:

```
DSLIST - Data Sets Matching DSN810.DB8G.ARC*           Row 1 of 4

  Command ===>                                        Scroll  ===> CSR

  Command - Enter "/" to select action       Message         Volume
 ------------------------------------------------------------------

            DSNA10.DBAG.ARCLOG1.D09181.T1359114.A0003011      VPWRKD
            DSNA10.DBAG.ARCLOG1.D09181.T1359114.B0003011      VPWRKD
            DSNA10.DBAG.ARCLOG1.D09181.T1425367.A0003012      VPWRKE
            DSNA10.DBAG.ARCLOG1.D09181.T1425367.B0003012      VPWRKE
```

DSLIST - List of Arclog datasets

Then enter a line command "del / purge " followed by = on each following line and press the ENTER key. See example:

```
 DSLIST - Data Sets Matching DSN810.DB8G.ARC*            Row 1 of 4

 Command ===>                                         Scroll  ===> CSR

 Command - Enter "/" to select action         Message         Volume
-----------------------------------------------------------------------
 del / purgeNA10.DBAG.ARCLOG1.D09181.T1359114.A0003011        VPWRKD
 =        DSNA10.DBAG.ARCLOG1.D09181.T1359114.B0003011        VPWRKD
 =        DSNA10.DBAG.ARCLOG1.D09181.T1425367.A0003012        VPWRKE
 =        DSNA10.DBAG.ARCLOG1.D09181.T1425367.B0003012        VPWRKE
```

Example of delete purge command

9 DB2 Maintenance

Every month the IBM Innovation Center, Dallas, applies maintenance to the DB2 systems. Most times, this maintenance requires actions to be taken after this maintenance is rolled in via an IPL of your system. It is the responsibility of each solution developer to perform these actions on their remote development system. Notification of the monthly maintenance is sent in an email to all of our software developers so that they are aware. If you are not receiving notification, please contact the IBM Innovation Center, Dallas to be added to the email distribution list.

We implement RSU level maintenance monthly and PUT level maintenance on a quarterly basis.

PUT level maintenance will be implemented as follows:

January = PUTyy12

April = PUTyy03

July = PUTyy06

October = PUTyy09

Information about the PTFs that were applied and the HOLD ACTIONS required for each PUT/RSU level of maintenance (Ie, PUTyy03, RSUyy04, RSUyy05....) can be found in PUTxxxx or RSUxxxx members in the following MVS datasets that are on your system:

DSNA10.SVSC.HOLDDATA

DSNB10.SVSC.HOLDDATA

JCL to execute the jobs to resolve the holdactions is found in:

DSNA10.SVSC.HOLDCNTL
DSNB10.SVSC.HOLDCNTL

The actions you must take are typically running a z/OS batch job that will perform the required task for you. The members in DSN*10.SVSC.HOLDDATA will give you instructions for JOBS that you must execute from a dataset named DSN*10.SVSC.HOLDCNTL. If the instructions tell you to Run DSN*10.SVSC.HOLDCNTL(REBIND), this is how you would do that:

1. Logon to TSO with the IBMUSER userid. This userid has DB2 SYSADM authority, which is needed to run the batch jobs.
2. Go to the dataset list utility - from TSO main menu, option 3 then 4 - or type 3.4 on the TSO main menu command line
3. Enter the dataset name DSN*10.SVSC.HOLDCNTL
4. Press the enter Key

5. Edit the member (place an E beside the member name and press the enter key)
6. Either remove the userid and password in the jobcard (1st or 2nd line in this job) or update the password for IBMUSER to match what it is on your system.
7. On the command line, type in SUB and press the enter key.
8. If you made an update to the JCL, you will need to type in CANCEL on the command line and press the ENTER key to back out of that member.

To view the job output:

1. go to the ISPF main menu (the menu shown when you first log on to TSO)
2. Type “SD” on the command line - press ENTER
3. Type “OWNER IBMUSER” on the command line and press ENTER
4. Type “ST” (for status) on the command line and press ENTER
5. You will see a display of the jobs you ran. Type a '?' beside the job that was just run
6. You will next see a list of job output files. Type an 'S' beside the JESMSGLG file and press enter. Make sure all steps got a RC = 0 . A return code = 4 may also be ok.

10 DB2 Utilities

DB2 comes with a standard set of utilites that are used to perform such tasks as COPY, UNLOAD, LOAD, REORG as well as others. All DB2 utilities are documented in the appropriate DB2 Utility Guide and Reference which can be found at the DB2 for z/OS - Technical Resources website.

Following are locations where you can find sample JCL to perform some of the more common utilities:

- DSNx10.NEW.SDSNSAMP(DSNTEJ2A) certain steps in this JCL will provide an example of UNLOAD and LOAD
- DSNx10.NEW.SDSNSAMP(DSNTEJ1) contains some sample JCL for REORG using LISTDEF
- DSNx10.NEW.SDSNSAMP(DSNTIJIC) contains sample JCL for performing an IMAGECOPY

Please note that NONE of this JCL can be run AS IS and would require heavy modification by the solution developer. Please be sure to reference the correct version of the DB2 Utility Guide and Reference for instructions on running each utility.

11 DB2 Product Tools

The IBM Innovation Center, Dallas DB2 systems support team configures certain DB2 product tools on each system that request DB2. Below are the DB2 product tools that are configured by default as well as a list of available products that can be configured upon request (and the high level qualifier)

11.1 Default DB2 product tools

DB2 for z/OS Version 10.1:

- IBM DB2 QMF CLASSIC EDITION V10.01.00
- IBM DB2 ADMINISTRATION TOOL FOR z/OS V10.01.00

DB2 for z/OS Version 11.1:

- IBM DB2 QMF CLASSIC EDITION V11.01.00
- IBM DB2 ADMINISTRATION TOOL FOR z/OS V11.01.00

11.2 All available DB2 product tools

DB2 for z/OS Version 10.1:

HLQ	PRODUCT
ACD211	IBM APPLICATION CONNECTIVITY TO DB2 FOR z/OS V02.01.01
ADBA10	IBM DB2 ADMINISTRATION TOOL FOR z/OS V10.01.00
GOCA10	IBM DB2 OBJECT COMPARISON TOOL FOR Z/OS V10.01.00
QMFA10	IBM DB2 QMF CLASSIC EDITION V10.01.00

DB2 for z/OS Version 10.1 products

DB2 for z/OS Version 11.1:

HLQ	PRODUCT
DDA211	IBM APPLICATION CONNECTIVITY TO DB2 FOR z/OS V02.01.01
ADBB10	IBM DB2 ADMINISTRATION TOOL FOR z/OS V11.01.00
GOCB10	IBM DB2 OBJECT COMPARISON TOOL FOR Z/OS V11.01.00
QMFB10	IBM DB2 QMF CLASSIC EDITION V11.01.00

DB2 for z/OS Version 10.1 products

11.3 How to access DB2 product tools

DB2 product tools can be accessed from the TSO ISPF primary option menu. When on the ISPF primary option menu, press the F8 key to scroll down to see more options. Seeing an option on this menu does not guarantee that it is available on the guest z/OS system.