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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.

**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.

**Dataset Information**

Db2 for z/OS datasets will have the following format and contain information as described below:

- The high-level qualifier is DSNxxx, with xxx representing the version and release of Db2, e.g. DSNA10, DSNB10 or DSNC10. If you have multiple Db2 subsystems of the same version, the high level qualifier could also be DSNx20.* where x represents the version of Db2.
- The sample installation and IVP jobs are found in library DSNxxx.NEW.SDSNSAMP.
- Installation, maintenance information, and configuration samples are provided in datasets named DSNxxx.SVSC.*.
- The default DSNZPARMS information is contained in dataset DSNxxx.NEW.SDSNSAMP(DSNTIJUZ)

**Instructions to start/stop the Db2 subsystem**

Db2 started tasks are found in dataset VENDOR.PROCLIB and follow a naming standard of DBxG*, where x is either A(V10), B(V11) or C (V12) 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 V12 is being started. To start Db2, issue the following command:

```
/DBCG START DB2
```

This will start the following tasks associated with Db2:

- **DBCGMSTR**
- **DBCGDBM1**
- **DBCGIRLM**
- **DBCGDIST**
- **DBCGADMT**

To stop Db2 and all associated started tasks, issue the following commands:
/F DBCGADMT,APPL=SHUTDOWN
/-DBCG DIS THD(*) (Use this command to look for active threads)
/-DBCG CANCEL THREAD(xx) where xx is the TOKEN from the display if there are any active threads.
/-DBCG STOP DB2

**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:

**DBPROCns** - '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, **DBPROCDBG** used to access DBBG and **DBPROCDCG** is used to access DBCG.

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
Accessing Db2 on the guest z/OS system remotely

Information needed to access the different levels of Db2.

<table>
<thead>
<tr>
<th>SSID</th>
<th>Location</th>
<th>TCPIP Port</th>
<th>IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBAG</td>
<td>DALLASA</td>
<td>5030</td>
<td>xx.xx.xx.xx</td>
</tr>
<tr>
<td>DBBG</td>
<td>DALLASB</td>
<td>5035</td>
<td>xx.xx.xx.xx</td>
</tr>
<tr>
<td>DBCG</td>
<td>DALLASC</td>
<td>5040</td>
<td>xx.xx.xx.xx</td>
</tr>
</tbody>
</table>

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 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.

To verify that WLM is active, navigate to SDSF and enter the display command /d wlm in the command line.

If WLM is missing, please contact zTech@us.ibm.com on how to refresh and resume.

**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 specifying 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 will help Db2 to 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 SYSDFELT ADD VOLUMES (VPWRKx)
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 its arclog datasets there. If your system was more recently built, your ARCHIVE logs may be SMS managed. See “SMS managed ARCHIVE log” instructions later.

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:

<table>
<thead>
<tr>
<th>UNIT</th>
<th>TYPE</th>
<th>STATUS</th>
<th>VOLSER</th>
<th>VOLSTATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0D33</td>
<td>3390</td>
<td>A</td>
<td>VPWRKD</td>
<td>STRG/RSDNT</td>
</tr>
</tbody>
</table>

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:

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

   %PWRKD,0,0,* ,Y   WORK VOLUME (% ADDED FOR 3380/3390)

4. 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 DBCG from the SDSF command line:
   - Check for active threads, issue /-DBCG DIS THD(*)
   - Terminate any active threads with /-DBCG CANCEL THREAD(xx) where xx is the TOKEN from the display.
   - Enter command /-DBCG STOP DB2
   - Enter command /F DBCGADMT,APPL=SHUTDOWN
   - Enter LOG to view the syslog and watch for message SUBSYSTEM DBCG READY FOR START COMMAND
   - Enter command /-DBCG START DB2 and watch syslog for message -DBCG DSNYASC 'START DB2' NORMAL COMPLETION
   - Look at the job output for DBCGMSTR to see if an Archive log was created during startup, if so, stop and start DB2 one more time.

1. When it is completely active - you can SUBmit the REBIND job.

2. 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.

**SMS managed ARCHIVE logs** are directed to the VPARC1 volume. If you need more ARCHIVE log space, please contact the Dallas team via email to zTech@us.ibm.com requesting an additional volume and that added to SMS.

### 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; you’re going to chance corrupting your Db2 data. Also, Db2 may not restart if you have deleted an archive log it needs.

**Non-SMS Managed**

If your Db2 locks up because it cannot archive its active logs, it is best to mount a DASD volume (see page 7, starting at step 4) as "storage" to allow Db2 to finish its archive process before you attempt to delete the archive logs.
SMS-Managed

If your Db2 Archive log data sets are SMS managed, you could examine the dates in the Archive log data sets to see if there are some that you could delete. If the date D17201 is prior to the last known IPL of the system, then it is a candidate for deletion. Delete some of the oldest pairs to see if you can get the archives to complete, see below for examples.

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.

```
DSN9022I  -DBCG DSNYASCP 'START DB2' NORMAL COMPLETION
IXL014I  IXLCONN REQUEST FOR STRUCTURE DSN10_GBPK0 096
         WAS SUCCESSFUL. JOBNAME: DBCGDBM1 ASID: 0041
CONNECTOR NAME: DB2_DBCG CFNAME: SVCF
DSNA672I  DBCG DSN10gbp HBG6 START COMMAND FOR ADMIN SCHEDULER DBCGADM TO
         DB2 "START COMMAND FOR ADMIN SCHEDULER DBCGADM TO"
         NORMAL COMPLETION
DSNL519I  -DBCG DSNLIRSY TCP/IP SERVICES AVAILABLE 098
         FOR DOMAIN S0W1.DAL-EBIS.IHOST.COM AND PORT 5042
```

_Db2 Starting Normally_

Note, even though you delete the DSNx10.DBxG.ARCLOG1.Date.Time.A000000# 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.SDNSAMP(DSN10GBPK0) 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 DBCG by entering DSN10.DBCG.ARC* in the following display.

```
Data Set List Utility

Option ===>

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

Enter one or both of the parameters below:
```

---

DB2 Reference Guide for IBM z/OS Remote Access Programs 9
Dsname Level . . . DSNC10.DBCG.ARC*
Volume serial . . .

Data Set List Utility

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

<table>
<thead>
<tr>
<th>Command</th>
<th>Message</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C10.DB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.ARC*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DSLIST - Data Sets Matching DSNC10.DBCG.ARC*  Row 1 of 4

Command ===>
Scroll ===> CSR

Command - Enter "/" to select action       Message         Volume

-------------------------------------------------------------------
DSNC10.DBCG.ARCLOG1.D09181.T1359114.A0003011      VPWRKD
DSNC10.DBCG.ARCLOG1.D09181.T1425367.A0003012      VPWRKE
DSNC10.DBCG.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:

<table>
<thead>
<tr>
<th>Command</th>
<th>Message</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>del /</td>
<td></td>
<td></td>
</tr>
<tr>
<td>purge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| NC10.DBCG.ARCLOG1.D09181.T1359114.A0003011      VPWRKD
| =       |         |              |
| =       |         |              |
| DSNC10.DBCG.ARCLOG1.D09181.T1425367.A0003012      VPWRKE
| =       |         |              |
| DSNC10.DBCG.ARCLOG1.D09181.T1425367.B0003012      VPWRKE

Example of delete purge command
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
DSNC10.SVSC.HOLDDATA

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

DSNA10.SVSC.HOLDCNTL
DSNB10.SVSC.HOLDCNTL
DSNC10.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 JESMSGGLG file and press enter. Make sure all steps got a RC = 0 . A return code = 4 may also be ok.

**Db2 Utilities**

DB2 comes with a standard set of utilities 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(DSNTIJ2A) certain steps in this JCL will provide an example of UNLOAD and LOAD
- DSNx10.NEW.SDSNSAMP(DSNTIJ1) contains some sample JCL for REORG using LISTDEF
- DSNx10.NEW.SDSNSAMP(DSNTIJJC) 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.
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)

**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 V11.01.00

Db2 for z/OS Version 11.1:
- IBM Db2 QMF CLASSIC EDITION V11.01.00
- IBM Db2 ADMINISTRATION TOOL FOR z/OS V11.02.00

Db2 for z/OS Version 12.1:
- IBM Db2 QMF CLASSIC EDITION V12.01.00
- IBM Db2 ADMINISTRATION TOOL FOR z/OS V12.01.00

**All available Db2 product tools**

Db2 for z/OS Version 10.1:

<table>
<thead>
<tr>
<th>HLQ</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACD211</td>
<td>IBM APPLICATION CONNECTIVITY TO Db2 FOR z/OS V02.01.01</td>
</tr>
<tr>
<td>ADBB10</td>
<td>IBM Db2 ADMINISTRATION TOOL FOR z/OS V11.01.00</td>
</tr>
<tr>
<td>GOCB10</td>
<td>IBM Db2 OBJECT COMPARISON TOOL FOR Z/OS V11.01.00</td>
</tr>
<tr>
<td>QMFA10</td>
<td>IBM Db2 QMF CLASSIC EDITION V10.01.00</td>
</tr>
</tbody>
</table>

**Db2 for z/OS Version 10.1 products**
Db2 for z/OS Version 11.1:

<table>
<thead>
<tr>
<th>HLQ</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDA211</td>
<td>IBM APPLICATION CONNECTIVITY TO Db2 FOR z/OS V02.01.01</td>
</tr>
<tr>
<td>ADBB20</td>
<td>IBM Db2 ADMINISTRATION TOOL FOR z/OS V11.02.00</td>
</tr>
<tr>
<td>GOCB10</td>
<td>IBM Db2 OBJECT COMPARISON TOOL FOR Z/OS V11.01.00</td>
</tr>
<tr>
<td>QMFB10</td>
<td>IBM Db2 QMF CLASSIC EDITION V11.01.00</td>
</tr>
</tbody>
</table>

_Db2 for z/OS Version 11.1 products_

Db2 for z/OS Version 12.1:

<table>
<thead>
<tr>
<th>HLQ</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDA211</td>
<td>IBM APPLICATION CONNECTIVITY TO DB2 FOR z/OS V02.01.01</td>
</tr>
<tr>
<td>ADBC10</td>
<td>IBM Db2 ADMINISTRATION TOOL FOR z/OS V12.01.00</td>
</tr>
<tr>
<td>GOCB10</td>
<td>IBM Db2 OBJECT COMPARISON TOOL FOR Z/OS V11.01.00</td>
</tr>
<tr>
<td>QMFC10</td>
<td>IBM Db2 QMF CLASSIC EDITION V12.01.00</td>
</tr>
</tbody>
</table>

.Db2 for z/OS Version 12.1 products_

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. The Db2 Object Comparison Tool is not customized on these systems.