BMC Next Generation Technology Subsystem for DB2 for z/OS Reference Manual

Supporting

Version 11.2 of BMC Next Generation Technology Check for DB2 for z/OS
Version 11.2 of BMC Next Generation Technology Load for DB2 for z/OS
Version 11.2 of BMC Next Generation Technology LOBMaster for DB2 for z/OS
Version 11.2 of BMC Next Generation Technology Reorg for DB2 for z/OS
Version 11.2 of BMC Next Generation Technology Stats for DB2 for z/OS
Version 11.2 of BMC Next Generation Technology Unload for DB2 for z/OS
Version 11.2 of BMC Next Generation Technology Utility Manager for DB2 for z/OS

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  — System hardware configuration
  — Serial numbers
  — Related software (database, application, and communication) including type, version, and service pack or maintenance level
■ Sequence of events leading to the problem
■ Commands and options that you used
■ Messages received (and the time and date that you received them)
  — Product error messages
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Chapter 1

Summary

☑ IMPORTANT:
This new Version 5.1.0 is required to support the new expanded RBA/LRSN which was introduced with DB2 11. BMC Next Generation Technology Subsystem (NGT Subsystem) V5.1.0 is downwardly compatible with NGT V930 (formerly CDB 930) so its migration can occur prior to migrating to DB2 11. Migration to NGT Subsystem V5.1.0 must be complete prior to DB2 11 NFM.

To make online operations possible without using extended function hardware, NGT uses a high speed I/O monitor and driver which captures changed pages during online utility runs. This does not use or interfere with the DB2 Buffer Manager or DB2 Logs. This subsystem address space should be started by the operator at IPL time and should remain in this state until the MVS system is brought down.

Jobs running BMC Next Generation Technology Reorg, BMC Next Generation Technology Unload or BMC Next Generation Technology Copy will need to obtain a point of consistency QUIESCE with DB2 before initiating a session with the CDB/Subsystem. Once this session is established, the Subsystem will monitor and save changed pages as explained above. Those pages will remain allocated by the subsystem until the session is terminated.

The NGT Subsystem has a number of initialization parameters as well as a set of operator commands. Initialization parameter defaults can be set during the customization phase of BMC Next Generation Technology Utilities or can be specified at subsystem startup.

The operator commands are made possible by means of the MODIFY z/OS system command and provide a method for displaying I/O statistics and sessions activity.
Chapter 2

Reference

Note: It is recommended that you place the NGT Subsystem in the same performance group as the DB2 DBM1 address space.

2.1 Installation

NOTE: Please do not set any parameters in your system procs; the new Subsystem will automatically determine what is best for performance. Use the following overrides only after consulting with BMC Customer Support about a specific issue.

The NGT Subsystem should be installed by copying the startup procedure CDBSS member of the installation control (CNTL) library to SYS1.PROCLIB or one of its concatenations, if any. The startup proc must be customized to reflect the true name of the CDB LOAD module library on the //STEPLIB DD statement and to set up the initialization parameters as follows:

**DSNM=number**

This parameter indicates to the subsystem the maximum number of DB2 datasets that can be monitored at any one point in time. The value specified must be a number between 64 and 32767 (inclusive). Once the specified limit is reached, the subsystem will not allow any new sessions to be established and will cause utilities to wait until entries are made available. The default value is 32767.

**NOTE**

If any NGT utility job issues the message CDBC193 (“WAITING FOR A DSNE SLOT”), that indicates the DSNM parameter value should be checked. If it is less than 15 K, it should be increased to 15 K.

**DSP=number**

This parameter indicates to the NGT Subsystem the maximum size, in units of megabytes, of the dataspace(s) that are used to save data pages. The value specified must be a number between 64 and 262144 (inclusive). Note that 262144 means 262144 MEG or 256 GIG. Also, if a small value is specified and the current change activity requires more storage than planned for, the concurrent mode utility job will fail. The dataspace storage is allocated and freed based on I/O and session activity needs. The default value for this parameter is calculated based on available frames and 50% of auxiliary paging slots.

**Caution:** The specified value is not checked to ensure that the operating system has enough paging resources to back up memory requirements. Specifying a large value could result in excessive paging and reduced throughput. It is therefore recommended to not specify a value for this parameter.

**SQA=number**

This parameter indicates to the NGT Subsystem the aggregate size, in units of Kilobytes, of common fixed memory to allocate for concurrent I/O activity. The value specified must be a number between 64 and 9999 (inclusive). This storage is used to hold control blocks and CCW’s to perform I/O and is allocated from subpool 228. Each I/O requires a minimum of 4K of storage and is obtained and freed on a demand basis. If more than the limit is requested, the current I/O
Summary

will be terminated and the job in session with the subsystem will eventually fail. The default for this parameter is 2048K which is capable of handling 512 simultaneous I/O's.

**RST=number**
This parameter indicates to the subsystem the maximum number of wall clock minutes to retain data for any NGT Copy after a failure. The value specified must be a number between 0 and 9999 (inclusive). A value of 0 is the default and it indicates that data retention will not be performed after a NGT Copy failure. A value between 1 and 9999, specifies the number of minutes for data to be retained in the subsystem's dataspace after a NGT Copy job failure. If the NGT Copy job is restarted within this time limit, the utility will resume its processing otherwise, it will start from the beginning. A Quickexit of the NGT Copy job will disconnect from the subsystem and free all related data. For example, if you specify:

| RST=30 |

This will allow a connection and its related data for any NGT Copy to be maintained by the subsystem for 30 minutes following a utility failure. If the utility is not restarted within 30 minutes, the job will be disconnected from the subsystem and its related data will be freed.

**LOGLIMIT=number**
This parameter indicates to the NGT Subsystem the maximum number of logging activity lines of output, in units of thousands, for the SYSPRINT file. When the limit is reached, the existing file is scheduled for SYSOUT processing and a new SYSOUT file is allocated and used for logging NGT Subsystem activity. Specify a number between 0 and 32767 (inclusive) with 0 meaning that no limit should be applied. A value of 0 is the default. Scheduling the SYSOUT file for processing on demand basis can also be performed via the NGT Subsystem "WRITE" command.

**GROUP=sysplex_group_name**
In a SYSPLEX environment, use this parameter to override the default sysplex group name of "ZCDBSS". All NGT Subsystem's in the sysplex must have a common group name.

**CSM=YES|NO**
Specifies Cross System Messaging (CSM) facility options. In a sysplex environment, messages printed in a NGT Subsystem log are broadcasted to all active NGT Subsystem s in the complex. To disable broadcasting, specify CSM=NO. The default is CSM=YES.

**UTL=number**
Specifies the upper memory limit allowed for a single utility connection. The limit is in units of Megs and can not be higher than the DSP limit. The default is the DSP limit. When the limit is reached, NGT Subsystem issues message CDBC152.

**XIPL=Y|N**
Specifies that cross IPL restart is allowed (Y for Yes) or not allowed (N for No). The default value is Y. A value of N means that existing sessions interrupted by an Shutdown/IPL of a remote machine will cause these sessions to fail.

A value of Y means sessions are allowed to continue processing provided that the following rules are adhered to:

1) NGT Subsystem startup must be performed prior to any DB2 startup under the current operating system. Once NGT Subsystem has completed the restart process, it will issue message CDBC199 indicating that DB2 startup should be performed by the operator. Note: CDBC199 is issued regardless of the XIPL parameter.

2) NGT Subsystem shutdown must be performed by the command "SHUTDOWN" and must be done after the termination of all participating DB2's in the current system.
3) All NGT Subsystem’s in the complex must have the XIPL=YES parameter in effect. When the above rules are not followed, the utility job will eventually fail and its NGT Subsystem will issue the following message:

CDBC339 SESSION VERIFICATION FAILED ON SYSTEM(xxxx)

**REASON reason_code**
System(xxxx) is the remote NGT Subsystem system and reason_code can be one of the following:

1. A restart error had occurred.
2. XIPL=YES was not specified.
3. Shutdown error had occurred and the remote NGT Subsystem is down.
4. DB2 is UP and NGT Subsystem is down
5. DB2 was shutdown after successful shutdown of the remote NGT Subsystem. This can occur if DB2 is mistakenly restarted after successful shutdown of NGT Subsystem.
6. A restart error had occurred or the remote NGT Subsystem does not have XIPL=YES specified.
7. A restart had occurred more than once. The latest was done without XIPL=YES or encountered a restart error.
8. Not used.
9. DB2 was started before the remote NGT Subsystem.

2.1.1 **Multiple NGT Subsystem versions**
It is recommended that all versions of the NGT Subsystem be the same. If this is not possible, a newer version of the NGT Subsystem can be isolated from older ones by specifying a different NGT Subsystem Sysplex group name. The default NGT Subsystem Sysplex group name is ZCDBSS and is implemented by the coding of GROUP=ZCDBSSXX on the parameter card.

Each LPAR can only have one NGT Subsystem process (NGT Subsystem) active. A DB2 Data Sharing group must have a NGT Subsystem on each LPAR with the same Sysplex Group name.

The LPARs of a Data Sharing Group can have NGT Subsystem at different versions. To tolerate this NGT Version 7.4.0 (formerly CDB 7.4.0) load libraries must be at maintenance level PTF88 or later.

2.2 **Start-Up**
To start the NGT Subsystem, with optional parameters, issue the following operator command:

S CDBSS

**Tip:** We recommend that you place this start command in member COMMNDXX of SYS1.PARMLIB so that the system is automatically started during the IPL process. When the NGT Subsystem is fully initialized, it will display message CDBC199 to the console.
2.3 **Shutdown**

To shutdown the subsystem, issue the following operator command:

```
F CDBSS,SHUTDOWN
```

or

```
F CDBSS,SHUT
```

This command performs an orderly shutdown. Valid only when XIPL parameter is in effect. Processing of this command ensures the following:

1. No local connection is active for utilities on the current system. If a utility is found connected, message CDBC338 will be issued. The shutdown command can be retried at a later time when all local connections have completed.

2. For remote connections, the local DB2 member must be inactive at the time of the shutdown. If a DB2 is found active, message CDBC333 will be issued for each remote connection. The shutdown command can be retried at a later time when all DB2's on the current system are brought down.

3. Remote session’s data is then transferred to the owning utility's NGT Subsystem DSP's memory. When not enough memory exists at the target system, CDBC337 will be issued. The shutdown command can be retried at a later time when memory is made available by the target system.

When all data is transferred, NGT Subsystem will issue the shutdown complete message CDBC198 followed by NGT Subsystem address space termination. Operator can safely IPL the machine without causing any remote connection failures.

☑ **NOTE:** Never issue the **MVS FORCE** command.

2.4 **Deactivation**

The subsystem can be deactivated without shutting it down. This basically has the same effect as STOP. Once all activity is drained, a message will be issued to confirm deactivation. Issue the following command to deactivate:

```
F CDBSS,INACT
```

2.5 **Activation/Re-Activation**

The subsystem can be activated by issuing the following command:

```
F CDBSS,ACT
```

2.6 **Data Sharing Considerations**

The NGT Subsystem must be started on all z/OS systems participating in the DB2 data sharing group. If the NGT Subsystem is not started on any particular member that has an active DB2, then the online (RW) utility will fail. In such an event, NGT Subsystem should be started on that particular system and the online utility should be restarted.
2.7 Tracing NGT Subsystem Activity

With instructions from BMC Support personnel, the operator may need to issue a command to trace certain subsystem events. The trace command syntax takes the following form:

`F CDBSS,TRACE event state`

where the parts of the command are summarized in Table 2-1 below.

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Meaning</th>
<th>Possible Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRACE</td>
<td>Initiates a trace activity.</td>
<td>You may also use T.</td>
</tr>
<tr>
<td>event</td>
<td>The type of event you wish to trace.</td>
<td>IO I/O trace start and end.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CCW Trace I/O start and end as well as each generated CCW. (CAUTION: This generates lots of output.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CI Trace all pages fetched from the dataspace by the utility job.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Send Trace control data send activity to the Cross System Coupling Facility (XCF) when in sysplex mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receive Trace control data receive activity from the Cross System Coupling Facility (XCF) when in sysplex mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vectors Trace DB2 page data vectors sent to and/or received from the XCF. This setting requires the activation of the Send and/or the Receive state.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ALL Trace all of the above.</td>
</tr>
<tr>
<td>state</td>
<td>Whether to activate or disable tracing.</td>
<td>ON Activate tracing activity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OFF De-activate tracing activity.</td>
</tr>
</tbody>
</table>

Table 2-1. NGT Subsystem Tracing Options.

The trace output will be routed to the SYSPRINT DD card allocated to NGT Subsystem.

2.8 Activity Log Command: Write

The WRITE command is issued as follows:

`F CDBSS,WRITE`

This command schedules NGT Subsystem activity log for SYSOUT processing. See the LOGLIMIT parameter on page 2-2 for more details.
The full instructions for cutting the log are:

1. At a console prompt, Issue the F CDBSS, WRITE command as shown above.
2. In SDSF, type PRE CDBSS to locate the NGT Subsystem started tasks (these will have the letters "STC" followed by 5-digit numbers – like "STC12345" – in the Job ID field). (You may need to clear the OWNER filter by typing the command "OWNER" on the command line.)
3. Type "DA" on the SDSF command line and press Enter to identify the currently running NGT Subsystem started task.
4. Enter "H" on the SDSF command line to go to the Held Output Display screen. You will see the NGT Subsystem started task process with the correct started task ID number
5. Type a "?" next to it and press Enter
6. Type a "C" and press Enter to purge the output.

2.9 Display Commands
A set of display commands has been incorporated into the products to provide statistics and session data that can be used in error scenarios. All major keywords and their operands can be abbreviated to a single character or characters that make it unique.

All commands output will be routed to the issuing console.

2.9.1 Display Dataset Name Table
To display the contents of the dataset name table, issue the following command:

F CDBSS,DISPLAY DSN

One line of output will be printed for each VSAM dataset currently being monitored for change activity. The group number which is used in the DISPLAY GROUP command is included in the output. See messages CDBC174 and CDBC175.

Example:

F CDBSS, D D

will display one line for each dataset in the DSN table.

2.9.2 Display Thread
To display the names of the JOBs that are currently in session with the NGT Subsystem, issue the DISPLAY THREAD command. The full syntax is as follows:

F CDBSS,DISPLAY THREAD jobname

where jobname is an optional operand that limits the display to only those JOBs having a name starting with this value.

For output formats, see messages CDBC164 and CDBC165.

Example:

F CDBSS, D T

will display a line for each JOB connected to NGT Subsystem.
2.9.3 **Display Group**

Each set of objects or datasets having a single consistency point is called a group. When a session is established for a new set of objects, a group is created and a sequential number is assigned to it. This is called the group number or ID and can be obtained from the DISPLAY DSN or DISPLAY THREAD commands.

The full syntax of the DISPLAY GROUP command is as follows:

```
F CDBSS,DISPLAY GROUP id s1 s2
```

- **id** is an optional operand specifying the group number you wish to display. If the group does not exist, no output will be generated.
- **s1** is an optional subcommand keyword that can be one of the following:
  - **T** - Specifies the display of threads under this group. The display will resemble that of the DISPLAY THREAD command and is formatted by messages CDBC172 and CDBC173.
  - **E** - Specifies the display of elements or datasets under this group. The display will include logical and physical characteristics of the dataset(s). The format of the output is documented by messages CDBC169, CDB170 and CDB171. To further limit the display of this subcommand to a subset of datasets, code the s2 parameter.
- **s2** is a dataset name mask that limits the display to datasets that have a name starting with this value.

The format of the output when no subcommand is present is documented by messages CDBC166 and CDBC167.

**Examples:**

```
F CDBSS,DISPLAY GROUP
Display all groups.

F CDBSS,DISPLAY GROUP 1
Display only group 1.

F CDBSS,DISPLAY GROUP 1 T
Display all threads connected to group 1.

F CDBSS,DISPLAY GROUP 1 E
Display all datasets managed by group 1.

F CDBSS,DISPLAY GROUP 1 E my.dataset
Display all datasets managed by group 1 and starting with "my.dataset".
```

2.9.4 **Display Storage**

To display ESQA storage and current active I/O events, issue the following command:

```
F CDBSS,DISPLAY STORAGE
```

For output format, see message CDBC163. For example:

```
F CDBSS,DISPLAY STORAGE
```

This will display current ESQA usage limit.
2.9.5 **Alter Commands**
A set of ALTER commands exists to permit changes to various system parameters. The ALTER command may be abbreviated to the letter "A".

```
F CDBSS,ALTER SQALIMIT nnnnn
F CDBSS,ALTER LOGLIMIT nnnnn
```

2.9.6 **Alter UTL**
To change the value of UTL, type:

```
F CDBSS,ALTER UTL nnnnn
```

or

```
F CDBSS,A U nnnnn
```

**Example:**

```
F CDBSS,A U 1024
```

**Note:** Since the units for UTL are in K (kilobytes), then 1024K is equal to 1 M (1 megabyte).

2.9.7 **Alter SQALIMIT**
To change the value of SQALIMIT, type:

```
F CDBSS,ALTER SQALIMIT nnnnn
```

or

```
F CDBSS,A S nnnnn
```

**Example:**

To set SQALIMIT to 4 M, type:

```
F CDBSS,A S 4096
```

**Note:** Since the units for SQALIMIT are in K (kilobytes), then 4096K is equal to 4 M (4 megabytes).

2.9.8 **Alter LOGLIMIT**
To change the value of LOGLIMIT, type:

```
F CDBSS,ALTER LOGLIMIT nnnnn
```

or

```
F CDBSS,A L nnnnn
```
Example:

F  CDBS,A  L  20

Note: Since LOGLIMIT is in thousands of lines of output, then 20 is equal to 20,000 lines.

To display any of these values, use the D S command.

2.10 Error Diagnosis

When abends occur in a system exit or during session establishment, NGT Subsystem will take an SVC dump. The DUMP title takes the following form:

CDBS ABEND xxxxxx AT mmmmmmm+nnnn,PSW=ppppppppppppppp,
IL=l,IC=c,TX=ttttttttt

where:

xxxxxx is the abend code
mmmmmmm is the abending module
nnnn is the offset into the abending module
pppppppppppppp is the PSW at time of error
l is the instruction length code
c is the interruption code
tttttttt is the translation address, if applicable
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