BMC Next Generation Technology
Installation Guide

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

Revised February 2016
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<thead>
<tr>
<th>Telephone</th>
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<td>+01 713 918 8800</td>
<td>+01 713 918 8000</td>
</tr>
</tbody>
</table>

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  - Product name
  - Product version (release number)
  - License number and password (trial or permanent)
- **Operating system and environment information**
  - Machine type
  - Operating system type, version, and service pack or other maintenance level such as PUT or PTF
  - 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
  - Messages from the operating system
  - Messages from related software
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Chapter 1

Installation Overview

The BMC Next Generation Technology Utilities (NGT Utilities) are easy to install. In many cases, installation and customization take less than an hour. Installation libraries are pre-configured to facilitate the process. These are the main steps:

1. Define the load libraries.
2. APF Authorization.
3. Set up and start NGT Subsystem.
4. Configure the NGT Utilities environment
5. Run test jobs.
6. (Optional) Install TCP/IP Listeners.
7. (Optional) Install ISPF Interface (CDBI).

The rest of this manual will describe the prerequisites for installing the utilities, considerations for planning & security, and the process for copying the load libraries.

If you need further assistance with installing NGT Utilities, call BMC Customer Support:
Chapter 2  Prerequisites

NGT Utilities require the following:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Currently supported versions of z/OS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared DASD</td>
<td>On all systems that share DASD, the high level qualifier 'CDB' must be added to the GRSRNLXX member on all the systems in the complex using the System Inclusion Resource Name List (RNL).</td>
</tr>
<tr>
<td>DB2</td>
<td>IBM supported versions of DB2.</td>
</tr>
<tr>
<td>CPU Hardware</td>
<td>NGT V11.2 has the same requirements as DB2. z990, z890, z9®, z10™, and subsequent 64-bit z/Architecture® processors.</td>
</tr>
</tbody>
</table>

If you have questions about something in your environment not listed here, please contact BMC Customer Support.

Enabled New Function Mode Not Supported

Enabled NFM (ENFM Mode) is not supported by any version of NGT-Utilities on any version of DB2 and actual operational results may vary.
2.1 Planning And Preparation

2.1.1 Definition of Libraries
NGT Utilities require the definition of the following datasets. These can be allocated in the distribution tape unload job or separately allocated using ISPF 3.2.

<table>
<thead>
<tr>
<th>Library</th>
<th>Contents</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>NGT.LOAD</td>
<td>NGT Utilities program modules</td>
<td>Library must be APF-authorized.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dataset Organization: PO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Length: 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Format: U</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block Size: 27998 required, 32760 suggested for optimal performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Directory Blocks: 40 or more</td>
</tr>
<tr>
<td>NGT.CNTL</td>
<td>Sample JCL, sample automation control points, configuration members</td>
<td>Dataset Organization: PO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Length: 80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Format: FB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block Size: 9040 recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Directory Blocks: 200 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APF-authorization not required</td>
</tr>
<tr>
<td>NGT.LOGPDS</td>
<td>Diagnostic facility, used to write a diagnostic dump if there is a problem with the NGT Utilities</td>
<td>Dataset Organization: PO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Length: 80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Format: FB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block Size: 9040 recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Directory Blocks: 50 or more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APF-authorization not required</td>
</tr>
<tr>
<td>NGT.CDBEXEC</td>
<td>Automation control point REXX EXECs and Server jobcard and JCL models.</td>
<td>Dataset Organization: PO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Length: 80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Format: FB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Block Size: 9040 recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Directory Blocks: 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APF-authorization not required</td>
</tr>
<tr>
<td>NGT.CKPT001</td>
<td>Checkpoint information required for the NGT Utilities</td>
<td>Do not place under control of any compression or DASD management software package; interference will cause processing problems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dataset Organization: VSAM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Space: 10 PRI cylinders, 50 SEC cylinders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Organization: LS (Linear Sequential VSAM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APF-authorization not required</td>
</tr>
</tbody>
</table>

Checkpoint Dataset Considerations
Prerequisites

At a minimum have one CDBCKPT dataset for each DB2 environment, e.g. Dev, QA, Prod. At most you can have one CDBCKPT for each DB2 subsystem. Typically each DB2, stand-alone DB2 or DS group, has its own CDBCKPT.

The checkpoint dataset (CDBCKPT) holds common files used across NGT processing. For the common files, a minimum of 300 tracks is required; more space may be required, depending on the size of the RTS tables and the number of applications intended to be defined.

It is recommended that the checkpoint dataset be defined with **10 cylinders primary allocation**, **50 cylinders secondary allocation** (as shown in the table above).

A checkpoint dataset **cannot be copied**. It can be dumped and restored, but not copied. Attempts to copy the checkpoint dataset result in a user abend code of U0008.

The checkpoint dataset is defined as VSAM format. It can grow up to 123 extents across 55 volumes to a maximum size of 2G (or 64G if allocated on "extended" DASD). Define the dataset with **multiple volumes** specified to allow it to grow.

If the CDBCKPT dataset hlq.CKPT0001 fills up, NGT will automatically allocate a hlq.CKPT0002 dataset to prevent failures. It is important to keep this CKPT0001 low level qualifier when creating your checkpoint dataset in the INSCLIBS installation job.

Redefinition of the checkpoint dataset is not recommended unless it is deemed absolutely necessary, as much common data used by NGT Utilities will be lost. If redefinition of the checkpoint dataset is determined to be required at any time, either all NGT utility jobs must be stopped, or the redefinition should be scheduled for a time frame in which no NGT utility jobs are active.

**NOTE**

Redefining the CDBCKPT dataset can cause data loss, call BMC Customer Support prior to redefining the checkpoint dataset.

The checkpoint dataset should be placed on a DASD volume that is backed up **daily**. For further information on backing up the checkpoint dataset, see Chapter 7 in this manual.

Run the CDBDISP command on a regular basis (see *BMC Next Generation Technology General User Guide* for details on proper use) and clean up (QUICKEXIT) jobs that have failed and are not marked as RESTART. You can adjust the value of the +OUTPUTAGE parameter to reduce the amount of time completed jobs stay in the checkpoint dataset.

**Block Size Considerations**

The minimum block size is 4096. Generally, the larger the block size the better the performance of loading NGT Utilities before execution. Since this occurs only once per utility step, the block size is not a major consideration except in the following circumstances: if you use a small block size such as 6144, you may find that for certain utility functions against small DB2 spaces (e.g., copying a table space of less than 10 cylinders) a disproportionate number of EXCPs reported is attributable to program fetch activity.
2.1.2 Dataset Access & Security Settings

Please see the tables below for the settings appropriate for your role.

<table>
<thead>
<tr>
<th>Installer</th>
<th>Library</th>
<th>Accesses Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NGT.LOAD</td>
<td>ALLOCATE / ALTER UPDATE READ EXECUTE</td>
</tr>
<tr>
<td></td>
<td>NGT.CNTL</td>
<td>ALLOCATE / ALTER UPDATE READ EXECUTE</td>
</tr>
<tr>
<td></td>
<td>NGT.LOGPDS</td>
<td>ALLOCATE / ALTER UPDATE READ</td>
</tr>
<tr>
<td></td>
<td>NGT.CKPT001</td>
<td>ALLOCATE / ALTER UPDATE READ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All Users</th>
<th>Library</th>
<th>Accesses Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NGT.LOAD</td>
<td>READ EXECUTE UPDATE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(If user needs authority to configure utilities)</td>
</tr>
<tr>
<td></td>
<td>NGT.CNTL</td>
<td>READ EXECUTE</td>
</tr>
<tr>
<td></td>
<td>NGT.LOGPDS</td>
<td>READ UPDATE</td>
</tr>
<tr>
<td></td>
<td>NGT.CKPT001</td>
<td>READ UPDATE</td>
</tr>
</tbody>
</table>

**NOTE:**
The CDBSS task only requires read/execute to the NGT.LOAD library.

**NOTE:**
Some systems may have ACF2/RACF rules already in place that will accommodate the NGT Utilities. For example, suppose SYS2 datasets have READ and EXECUTE access for everyone and SYS3 datasets have READ, EXECUTE, and also UPDATE access for everyone. If this is the case, then BMC Next Generation Technology LOAD could be installed as SYS2.NGT.LOAD, NGT.CNTL could be installed as SYS2.NGT.CNTL, NGT.LOGPDS could be installed as SYS3.NGT.LOGPDS, and NGT.CKPT001 could be installed as SYS3.NGT.CKPT001.

2.1.3 APF Authorization Required

Ensure that the NGT load library (formerly CDB Load library) is APF-authorized. To update the APF list issue the following MVS system command at any MVS console:

```
SETPROG APF,ADD,DSNAME=LIBRARY,VOLUME=volume
```
2.1.4 **DB2 Plan Authorizations**

You should grant EXECUTE authority on the NGT Utilities plan to those individuals that will be running NGT Utilities.

All DB2 utility authorizations are checked by NGT Utilities at runtime. Secondary authorization IDs are supported.

NGT Utilities require the following minimum access privileges are present before allowing execution. SYSADM and SYSCTL levels have all required accesses.

<table>
<thead>
<tr>
<th>Product</th>
<th>VSAM Authority</th>
<th>Minimum DB2 Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPY</td>
<td>READ</td>
<td>IMAGCOPYAUTH</td>
</tr>
<tr>
<td>LOAD</td>
<td>ALTER</td>
<td>LOADAUTH</td>
</tr>
<tr>
<td>REORG</td>
<td>ALTER</td>
<td>REORGAUTH</td>
</tr>
<tr>
<td>REORG INDEX</td>
<td>ALTER</td>
<td>REORGAUTH</td>
</tr>
<tr>
<td>UNLOAD</td>
<td>READ</td>
<td>IMAGCOPYAUTH</td>
</tr>
<tr>
<td>UNLOAD SHRLEVEL CHANGE</td>
<td>READ</td>
<td>SELECTAUTH</td>
</tr>
<tr>
<td>CDBSTATS</td>
<td>UPDATE</td>
<td>authorization not checked</td>
</tr>
<tr>
<td>REBUILD INDEX</td>
<td>ALTER</td>
<td>authorization not checked</td>
</tr>
</tbody>
</table>

The VSAM authority must be held by the individual running the NGT Utilities or by the userids specified in the global parameter +RACFID. For an explanation of +RACFID, see the *BMC Next Generation Technology General User Guide*. 
Chapter 3

Installing NGT Subsystem

✔️ IMPORTANT:
The BMC Next Generation Technology Subsystem is required for all NGT Utilities. Do not skip this section. You must install the NGT Subsystem or the utilities will not run.

To install the NGT Subsystem, follow these steps:

1. Copy the member CDBSS from the distribution control library to SYS1.PROCLIB.
2. Change the name of the DSN on the //STEPLIB DD to that of your NGT Utilities load module library.
3. At an MVS operator console, start the CDBSS by issuing the command S CDBSS. If data sharing is active, you will need to perform this step once on each of those systems.

The NGT Subsystem should be installed by copying CDBSS, the startup procedure member of the installation control (CNTL) library, to SYS1.PROCLIB or one of its concatenated datasets, if any. The startup proc must be customized to reflect the true name of your installation's NGT LOAD module library on the //STEPLIB DD statement.

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

For more information and several important notes on the NGT Subsystem, please see the BMC Next Generation Technology Subsystem Reference Guide
Installing NGT Utilities

You will receive the NGT Utilities LOAD and CNTL libraries via the BMC Install.

4.1 NGT Utilities Installation

☑️ NOTE:
The following steps are to be performed with the "CNTL" library.

4.1.1 INSCLIBS: Install Job to Create Libraries

This job will create your LOGPDS, CDBEXEC and CDBCKPT datasets. It will also copy members to the CDBEXEC and NGT LOAD libraries.

1. Open member INSCLIBS for editing.
2. Specify the high-level qualifier of your NGT LOAD and CNTL libraries in the YOURCDB on the first line. (Be careful not to delete the comma at the end of the first line.)
3. Specify your DASD unit name on the second line.
4. Add a JOB statement to the top of the file.
5. Submit the job.

☑️ NOTE:
See Chapter 7 for NGT Checkpoint Maintenance job.

4.1.2 INSCNFIG: Install Job to Configure the NGT Utilities for a DB2 Subsystem

☑️ NOTE: The NGT Load library must be APF authorized.

1. Copy member INSCNFIG to a member called CNFGssid, where ssid is the 4 character DB2 subsystem ID being configured. You should create one member for each system being configured. For example, if you wish to configure three DB2 subsystems DB2D, DB3T and DB4P, you should create members CNFGDB2D, CNFGDB3T and CNFGDB4P.
2. For each member you’ve created, on the //CONFIG statement (approx. line 8), change the SSID character string to the appropriate DB2 subsystem id. For example, if your member is called CNFGDB2D, you should overtype "SSID" with "DB2D". (Be careful not to delete or overtype the comma.)
3. Change the value of YOURCDB (approx. line 9) to the high-level qualifier of your CDB libraries. For example, if your high-level qualifier is SYS2.NGT, you should overtype YOURCDB with "SYS2.NGT".
4. Change the value of ‘COMPANY NAME’ to your company name. For example if you are ABC Widgets Inc. then CHANGE ‘COMPANY NAME’ ‘ABC Widgets, Inc.’.
Installing NGT Utilities

5. If you have a different dataset containing your model server JCL and JOB statement, then edit the CDBSVR DD statement to point to that dataset name (approx. line 25).

6. Edit any parameters you wish to change for an entire system (approx. line 36). Each utility job run will have your selections as defaults. See BMC Next Generation Technology General User Guide Chapter 5, "Parameters", for details on the possible parameter values you can specify. Also each utility has its own parameters and each utility manual has a parameter chapter.

7. Most installations will need to change the value for parameter +WORKPREFIX. Select a dataset high-level qualifier with a large pool of DASD available to it.

8. Add a JOB statement to the top of the file.

9. Submit the job.

The submitted job will create members with the name format RX10ssid and RX11ssid in the NGT Load library specified in the LOAD DD in the configuration job (once for each DB2 group or subsystem), and will contain the configuration options for that system. The RX10 member will have the default parameters for the utilities and the RX11 member will have the default libraries for the utilities. These NGT parameters and NGT libraries are obtained from this one CNFGssid job.

☑️ NOTE: To update the configuration (for example, to change any parameter defaults), simply edit the appropriately named member CNFGssid with any changes and resubmit the job.

☑️ IMPORTANT:
The +WORKPREFIX parameter names the high-level qualifier for work DASD used by NGT utilities. Some of these large datasets may be present for a few days. These datasets should have access to a large pool of DASD with Extended Addressability enabled. Do not use a pool that does any automatic cleanup, NGT Utilities manage the deletion of NGT workfiles.
4.1.3 **IBNDPACK: Install Job to Bind Packages**

1. Copy member **IBNDPACK** to a member called **BINDssid** where **ssid** is the subsystem ID for the DB2 system you wish configured.

2. Change all **YOURDB2** to your DB2 high level qualifier. For example, if your high-level qualifier is DSN810.DSN1, you should CHANGE ALL **YOURDB2** 'DSN810.DSN1'.

3. Change all **YOURCDB** to your NGT high level qualifier. For example, if your high-level qualifier is SYS2.NGT you should CHANGE ALL **YOURCDB** to 'SYS2.NGT'.

4. On the line reading "DSN SYSTEM(SSID)" (approx. line 24), change the characters “SSID” to **your DB2 Subsystem ID**.

5. If you need to provide a secondary authorization, you may add the DB2 **OWNER** keyword. You will need to add one OWNER keyword after each of the BIND PACKAGE instructions. If owner is added, each of the BIND PACKAGE instructions should resemble the following:

   ```
   BIND PACKAGE(CDB) -
   OWNER(yourid) -
   ACTION(REPLACE) -
   ENABLE(BATCH,DB2CALL) -
   EXPLAIN(NO) -
   FLAG(I) -
   ISOLATION(CS) -
   MEMBER(SFXDFX) -
   QUALIFIER(SYSIBM) -
   RELEASE(COMMIT) -
   SQLERROR(NOPACKAGE) -
   VALIDATE(RUN)
   ```

   where **yourid** is the DB2 secondary authorization ID.

   **NOTE:** Do not make any other changes to Bind statement and only run these binds using this program, otherwise there will be errors in the Bind process..

6. Add a **JOB** statement to the top of the file.

7. **Submit the job.**

**Additional Information**

The binding of package SFXDYNFX on a DB2 V8 subsystem requires IBM DB2 Version 9 Compatibility PTF UK90008 (See PK11129). This IBM PTF must be applied in order for this process to work.

**NOTE:** If binding NGT Version 9 packages on a DB2 Version 8 Compatibility Mode (CM) subsystem, package **CDBSQLF3** will fail with a SQLCODE of -4700. Package CDBSQLF3 is for support of Multi-Row Fetch (MRF) in Unload. This package bind job (IBNDPACK) should be rerun when the DB2 subsystem is completely migrated to New Function Mode (NFM), after which point CDBSQLF3 will bind successfully and the MRF Unload option can be used.
4.1.4 **IBNDPLAN: Install Job to Bind Plans**

1. Copy member **IBNDPLAN** to a member called **PLANssid** where **ssid** is the subsystem ID for the DB2 system you wish configured.

2. Change all **YOURDB2** to your DB2 high level qualifier. For example, if your high-level qualifier is DSN810.DSN1, you should **CHANGE ALL YOURDB2** to **DSN810**.

3. Change all **YOURCDB** to your NGT high level qualifier. For example, if your high-level qualifier is SYS2.NGT, you should **CHANGE ALL YOURCDB** to **SYS2.NGT**.

4. On the line reading **"DSN SYSTEM(SSID)"** (approx. line 20), change the characters **"SSID"** to your **DB2 Subsystem ID**.

5. Optionally, **change any occurrences** throughout the file of the plan name **"CDBPLAN"** (approx. lines 38, 69, and 73) to match the plan name default at your location. (Be very careful typing around the parentheses.)

6. If you need to provide a **secondary authorization**, you may add the DB2 **OWNER** keyword. You will need to add one **OWNER** keyword after each of the **BIND PLAN** instructions. If owner is added, each of the **BIND PLAN** instructions should resemble the following:

   ```
   BIND PLAN(CDBREXXC)  -
   OWNER(yourid)        -
   ACTION(REPLACE)      RETAIN -
   CACHESIZE(0)         -
   EXPLAIN(NO)          -
   FLAG(I)              -
   ISOLATION(CS)        -
   PKLIST(              -
                      *.CDB.*   -
                      *.R2DCC001.* -
                  )      -
   RELEASE(COMMIT)      -
   VALIDATE(RUN)        -
   ```

   where **yourid** is the DB2 secondary authorization ID.

7. Add a **JOB** statement to the top of the file.

8. **Submit the job.**

**Additional Information**

You can use the same plan name for Version 9 as you do for Version 7 and both will work concurrently. Because different versions of NGT Utilities can run concurrently under the same plan, planname **CDBPLAN** is recommended.

The plan name used here must correspond to the one specified in the configuration job (CNFGdbid). Change the **+PLAN** parameter and rerun the configuration job if necessary.

---

4.1.5 **Edit Allocation Automation in the "CDBEXEC" Dataset**

☑ **NOTE:** We are now editing members in the CDBEXEC dataset, not the CNTL dataset.
## Installing NGT Utilities

### 4.1.5.1 Member XSUTDBMG: Allocate Work Files

1. Open member XSUTDBMG for editing. This automation control point file controls the creation and extension of the NGT Work File VSAM datasets for job executions.

2. **Locate all comments** in the JCL marking which lines can be updated with correct volume or SMS information (Approx. lines 37 to 41). If you are using SMS you will probably not need to change anything.

3. **Save this file.** It will be executed each time you run a NGT Utilities job.

### 4.1.5.2 Member XCPYDYNM: Allocate Copy Datasets

1. Open member XCPYDYNM for editing. This automation control point file controls the creation of the image copy datasets.

2. In the `DATASET` subroutine set the `GDGLIMIT`, and edit the `DSNAME` to the naming standard you would like to use for image copy dataset names. If you are migrating from a previous version of NGT Utilities, you can cut and paste your prior logic here.

3. **Save this file.** It will be executed each time you run a NGT Utilities job that creates an image copy.

### 4.1.5.3 Member SVRJOBCD: Server JOB Card Model JCL

1. Open member SVRJOBCD for editing.

2. You may edit the job name mask in the first line of this file, but it is only necessary if you have shop standards enforcing the names of jobs. The job name mask controls the naming of Server jobs automatically generated during NGT utility processing. For more information on creating job name masks, see *BMC Next Generation Technology General User Guide* Sec. "Literals For Job and Step Name".

3. **Save this file.** This job card model will be used each time you run a NGT Utilities job.
4.1.6 Test the Installation (Optional):

☑️ **NOTE:** *We are now editing members in the CNTL dataset again.*

You’re now ready to run a job verifying that the installation was completed properly. You can use NGT CNTL library member MASTERJB to run a test of the NGT-Reorg utility (or any other utility for which you’re licensed); simply alter the SYSIN statement accordingly and submit the job.

1. Open member MASTERJB for editing.
2. Change all YOURDB2 to your DB2 high level qualifier. For example, if your high-level qualifier is DSN810.DSN1, you should CHANGE ALL YOURDB2 ‘DSN810.
3. Change all YOURCDB to your NGT high level qualifier. For example, if your high-level qualifier is SYS2.NGT you should CHANGE ALL YOURCDB ‘SYS2.NGT’
4. Update the /CDBUSTEP EXEC statements PARM= (approx. line 8) with the name of your DB2 subsystem (change “SSID” to your subsystem identifier).
5. Update the SYSIN statements (approx. line 20) with a database and table space name. You may also substitute the control statement for another licensed NGT utility if you wish.
6. Add a JOB statement to the top of the file.
7. Submit the job.

A successful completion code means the utilities are ready for general use.

☑️ **NOTE:**

Some NGT Utilities may require additional datasets when executed. See the particular NGT Utilities manual for details.
Installing TCP/IP Listeners

Chapter 5

Installing TCP/IP Listeners

An optional part of NGT Utilities now is installing TCP/IP listeners. A listener is an input-output port through which instructions are passed back and forth between the ISPF based CDBI interface and your mainframe installation's NGT operating environment. This TCP Listener and the CDBI application covered next is optional as it is not necessary to run utilities.

A sample standard JCL procedure member CDBTCPSV is provided in the NGT distribution CNTL library. Modify this member to adhere to your installation standards and to reflect your execution requirements. CDBTCPSV can either be executed directly as a started task (STC) or modified to run as a MVS job. Several symbolic parameters are available to enable ease of use for executing multiple copies of this procedure as a started task.

If you do not wish to modify this member, then it will be necessary to provide overrides for the symbolic parameters for each execution of this task.

Additional DD statements may be incorporated into the JCL as required. However, this is not usually necessary, since all other required datasets are dynamically allocated from the NGT Configuration.

☑ IMPORTANT
Whenever you recycle your LPARs, be sure to restart your listeners. Listeners are not automatically restarted when DB2 is restarted.

5.1.1 Defining and Starting Listeners

Get familiar with the use of Listeners and Ports in the next Chapter of this manual before setting up your Listener tasks.

The following example assumes you're running the SDSF utility on your system.

Step 1. Contact your MVS system administrator to identify available TCP/IP listener ports that are not being used by any other process. You will need a unique port number for each listener you wish to run simultaneously. This will allow you to start a TCP/IP server task for each CDBCKPT (NGT checkpoint dataset) and each version of DB2 to which you want to connect.

NOTE
While a CDBCKPT can be associated with multiple versions of DB2, a listener can only monitor one version of DB2. This is because listeners use DB2 load libraries and DB2 does not allow access to one version of DB2 with another version's load library.

NOTE
The NGT utility ID parameter (also known as the UID parameter) is used to supply the PORT to the listener task. The port number can be a 1 to 5 digit number. A character prefix should be provided. Member CDBTCPSV, as shipped, provides prefix "TCP". If the character prefix ends with a number it will be assumed to be part of the PORT number which could cause an error.

For example, if the EXEC statement reads as follows:
Installing TCP/IP Listeners

```
//TCPSTART EXEC PGM=CDBTCP9301,PARM='DSNP,TCP9301'
then port 9301 will be used for the listener.
```

Step 2. Type the following on the SDSF command line in upper case:

```
/S CDBTCP9301, JOBNAME=TCPnnnnn
```

where `nnnnn` identifies the 1-5 digit port number to use

This will use the default values that you have specified for each of the symbolic parameters in the procedure. `JOBNAME` provides a unique name for each task, and allows for identification of that specific task, when communicating with MVS.

To override symbolic parameters, enter the following command:

```
/S CDBTCP9301, JOBNAME=TCPnnnnn, name=value
```

where `name` identifies the name of a symbolic parameter to be overridden, and `value` identifies the new value for the named parameter. Multiple overrides can be specified, in any sequence, separated by commas.

Step 3. If the command is longer than the available space on the command line, either type a `/` (forward slash) as the first character of the command before typing the rest of the command, or insert a `+` (plus sign character) as a suffix to the initial portion of the command. This will inform SDSF that the command is incomplete. Press the Enter key, and continue typing the command, then press Enter again.

Step 4. Check the system console display or view the system log via SDSF for messages indicating the activity of the started TCP/IP port. Correct any failures that may prevent execution such as JCL errors, etc., and then restart the task or job.

Step 5. Optional. In the supplied CDBTCP9301 member you will find this line commented out:
```
//*SYSTCPD DD DISP=SHR,DSN=TCPPIP.DATA
```

 Uncomment and supply the dataset (or member) for the LPAR on which the Listener is running. This is sometimes needed to prevent ERRNO 1011.

5.1.2 Other Operations

The following example assumes you’re running the SDSF utility on your system.

5.1.2.1 Stop Listener Port

To stop execution of a listener port from SDSF, enter the following command:

```
/P TCPnnnnn
```

where `nnnnn` is the same 1-5 digit port number specified on the previous `/S` command

If necessary, other standard MVS commands, such as CANCEL or FORCE, may be used to halt execution of a runaway task or job.

5.1.2.2 Enable Listener Tracing

Tracing of the two-way TCP/IP communication between the console and the listener is also available. However, TCP/IP tracing is not recommended, unless requested by BMC Customer
Installing TCP/IP Listeners

Support, since the amount of additional data being captured may be excessive, and will increase spool usage.

To enable TCP/IP tracing, enter the following command:

```
/F TCPnnnnn,TRACE ON
```

where `nnnnn` is the **same 1-5 digit port number** specified on the previous `/S` command.

5.1.2.3 Disable Listener Tracing

To disable TCP/IP tracing, enter the following command:

```
/F TCPnnnnn,TRACE OFF
```

where `nnnnn` is the same 1-5 digit port number specified on the previous `/S` command.

**NOTE:** Listener tracing is disabled by default when a task or job is started.

5.1.3 Correct Use of the TCP/IP Listener

Here are some important points to remember in order to use TCP/IP listener ports properly:

- Each executing task or job must reference a **single, unique checkpoint dataset**.

- Multiple NGT users **can share** the same checkpoint dataset.

- Each executing task or job must reference a **single, unique TCP/IP port number**.

- Multiple NGT users **can share** the same port number.

- Due to DB2 restrictions, each executing task or job must reference a **single version of DB2 load libraries**. This means that only the DB2 subsystems associated with a particular version of DB2 can be interrogated by executing tasks or jobs that reference that same DB2 version.

- **Checkpoint datasets can be shared between different versions of DB2**, but due to the above DB2 restriction, subsystems associated with different versions of DB2 cannot be interrogated simultaneously.

- BMC recommends that CDBI users have one NGT Checkpoint per DB2 (stand alone DB2 or DS group). Then each checkpoint would have a Listener and each Listener would use a TCP/IP Port.
Chapter 6

Installing CDBI Display Utility

On the CDBI menu is a Display Utility option. This is an optional facility that uses TCP/IP to get output and information from the NGT Utilities VSAM datasets and present it through an ISPF interface. With this facility you can see NGT utilities past and present, view output, and view other NGT utility information.

6.1 Setup to use CDBI (CDB Interactive)

This new ISPF based display utility requires a listener be started. Refer to Chapter 5 of the *BMC Next Generation Technology Installation Guide* for instructions on starting the listener(s).

CDBI is set up using the PORTS and TERMJCL members in the NGT CNTL library. Both are discussed below.
6.1.1 PORTS Member

In the CNTL library, copy member IPORTS to a member called PORTS.

Edit the highlighted portion of member PORTS in the NGT CNTL library to specify the TCP/IP Port Number from the listener. (Do not specify an IP address; processing will determine this automatically.) This will be used by the CDBI ISPF application to communicate with NGT processing through the listener.

The PORTS member must contain a numbered list of port numbers. An example might look like this:

```rexx
/* rexx */
/* specify your port number and tcp/ip location */

ports:

parse arg p#
src = socket("INITIALIZE","MYSET01"); /*12010*/
if perror(src,"INITIALIZE") = 0 then do /*12010*/
   /* say socket("GETHOSTID"); */ /*12010*/
   ipad = socket("GETHOSTID"); /*12010*/
end; /*12010*/
src = socket("TERMINATE","MYSET01"); /*12010*/
src = perror(src,"TERMINATE"); /*12010*/
ipad = word(ipaddr,2)

ports.1 = '9301 'ipad
ports.2 = '9302 'ipad
ports.3 = '9303 'ipad
ports.4 = '9304 'ipad
ports.5 = '9305 'ipad
ports.0 = 5

if p# = 0 then return ports.0
return ports.p#

/* This routine returns -1 if the first word if arg 1 is not zero */
perro: if word(arg(1),1) = 0 then return 0; else
   Say arg(2) "Error : "arg(1);
return -1;
```

Note that there are five ports specified, numbered 1 through 5.

The last variable, ports.0, must be set to the number of ports being defined.

**IMPORTANT**

Use care when editing the PORTS member. Do not delete any of the words that say "ipad" or delete the end of those lines. It is suggested you overtype the port numbers rather than deleting and inserting them. Be sure that the value for ports.0 matches the number of ports specified above it, and that the ports variables are sequential.
6.1.2 **Details for editing the PORTS Member**

The `ipad` variable resolves to the IP address of the member CDBI is running on. In a Data Sharing environment this may not be where the Listener is running which would prevent CDBI apps from finding the NGT Checkpoint.

The Customer should specify the LPAR’s IP address, or better still its Domain Name if one is assigned. For example:

```
ports.1 = '9300 172.24.48.140'  ← LPAR’s IP address follows the PORT number
ports.0 = 1
```

- Or -

```
ports.1 = '9300 MVSDB2A'  ← Best to specify domain name after the PORT number
ports.0 = 1
```

This assumes the Listener is always started on LPAR MVSDB2A. If this is a three way data sharing and the Listener could be started on either one of them, like for rolling IPLs, then the PORTS member should look like this:

```
ports.1 = '9300 MVSDB2A'
ports.2 = '9300 MVSDB2B'
ports.3 = '9300 MVSDB2C'
ports.0 = 3
```

This way we will find it wherever it is active.

Furthermore, if the customer chooses to assign a Virtual IP Address to the listener for resolution to the three LPARs, then the Listener itself which is shipped with:

```
//CDBTCPSV EXEC PGM=CDBTCPSV,COND=(0,NE),REGION=0M,TIME=NOLIMIT,
//PARM='&ENV,TCP&PORT'
```

Should have the PARM changed to say ANY rather than TCP as follows:

```
PARM='&ENV,ANY&PORT'
```

Then the ports member does not need to list the PORT for all three LPARs, it only needs:

```
Ports.1 = '9300 172.24.48.150'  ← assuming 150 is the assigned virtual address for the Listener
-Or-
Ports.1 = '9300 LISTENER'  ← assuming the virtual address was assigned the Domain name ‘LISTENER’
```

As with before this change, the PORTS member is how CDBI applications find the appropriate Listener applications. So you can name many Ports.n for all the DB2s available to this CDBI. Just update the Ports.0 to specify how many Ports.n are in the list.

If for some reason there is a need to have two listeners on different LPARs with the same port number, then a character can be added to the Listener’s PARM for uniqueness as follows:

```
//CDBTCPSV EXEC PGM=CDBTCPSV,COND=(0,NE),REGION=0M,TIME=NOLIMIT,
//PARM='&ENV,TCP&PORT,A'
```
6.1.3 TERMJCL; Quickexit Skeleton

In the CNTL library, copy member ITERMJCL to a member called TERMJCL.

The CDBI facility can submit Quickexit jobs. Before running Quickexits through this facility, member TERMJCL must be edited in the NGT CNTL library: modify the JOB statement and supply STEPLIB libraries.

Do not change the EXEC card, the SSID and UID will be automatically set when the JCL is submitted.

```
//&ZUSER.F JOB '05686312,CDB',MSGLEVEL=(1,1),MSGCLASS=X,  << adjust job card
      NOTIFY=&SYSUID,PRTY=9,REGION=0M,CLASS=A  << as needed
//*                                                                 
//QE EXEC PGM=CDBUTIL,PARM='SSID,,QUICKEXIT'  << DO NOT CHANGE
THIS                                                                 
//STEPLIB DD DISP=SHR,DSN=CDB.UTILS.V906.LOAD  << change CDB  
library                                                          
//                                                                 
library                                                          
//                                                                 
library                                                          
//SYSPRINT DD SYSOUT=*                                             
//SYSOUT DD SYSOUT=*                                              
//SYSEXERROR DD SYSOUT=*                                           
//SYSIN DD *                                                      
```

6.1.4 Starting CDBI

Now this new facility can be started with the simple command:

```
EX 'yourCDBhlq.CNTL(CDBUTDSP)' 
```

Or put the following REXX exec in a library in your SYSPROC or SYSEXEC concatenation with member name CDBI:

```
/*REXX*/
ADDRESS TSO "EX 'yourCDBhlq.CNTL(CDBUTDSP)'' 
```

Then CDBI is started by typing CDBI from the ISPF Command Shell or TSO CDBI from any panels command line. The fist thing you see is the CDBI menu.

Enter 1 to see the Display Utilities facility.
Chapter 7

NGT Checkpoint Dataset Maintenance

The CDBCKPT is a NGT repository used to hold pertinent information for the NGT Utilities.

The NGT Checkpoint has a directory and internal files. The directory maps internal files in the repository and it is implemented as a DB2 TYPE2 index. The index also maps free space in the repository.

7.1 NGT Checkpoint Reorganization

The NGT checkpoint repository can be maintained with one simple job which should be run every six months. See sample job below.

The directory index can be reorganized to speed up the process and reduce its size due to page splits. The DBMG REORG statement is for this purpose.

The directory also contains free space records. After excessive use those records need to be compacted in order to improve performance and reduce the size of the index. The DBMG COMPACT statement is for this purpose.

Before running REORG or COMPACT, it is recommended to run DBMG CHECKIX to ensure the validity of the directory index.

In the checkpoint repository there are other indexes that need to be reorganized. The DBMG OPTIMIZE statement is for this purpose.

Finally, there is a DBMG REPORT statement run before and after the reorganization statements; this is required for diagnosis in the case of errors.

SAMPLE JOB

Running this job twice a year, monthly on very busy systems, will maintain the performance and size of your CDBCKPT dataset. This job is not disruptive; it can run concurrent with NGT utilities.

```plaintext
//DBMG    EXEC PGM=CDB1DBMG
//STEPLIB DD DISP=SHR,DSN=your.cdb.loadlib
//SYSPRINT DD SYSOUT=*  
//CDBPRINT DD SYSOUT=*  
//SYSIN DD *

    DBMG REPORT   LOGDS(your.cdbckpt)
    DBMG CHECKIX  LOGDS(your.cdbckpt)
    DBMG OPTIMIZE LOGDS(your.cdbckpt)
    DBMG COMPACT  LOGDS(your.cdbckpt)
    DBMG REORG    LOGDS(your.cdbckpt)
    DBMG REPORT   LOGDS(your.cdbckpt)
```
If the CHECKIX fails the statements that follow the CHECKIX will not be executed; send the job output to BMC Customer Support for diagnosis.

7.2 Backup NGT System Datasets

7.2.1 LOGPDS
The LOGPDS is a PDS (it can also be defined as a PDSE) that is used to write a mini-dump when a NGT utility abends with an 0C3 due to unexpected results from one of its many integrity checks.

This PDS should have its older members deleted periodically. The members are only needed to document current issues. This PDS can be periodically redefined. Place the LOGPDS dataset on a volume that is backed up periodically in order to facilitate disaster recovery.

7.2.2 CDBCKPT
The CDBCKPT (also known as "checkpoint") dataset contain checkpoint/restart information for utilities and should be backed up. It keeps track of active and restartable NGT Utilities, registration of NGT RTS tables, registration of NGT applications, and the AMS override. This dataset, although critical to a NGT utility environment, require little additional maintenance other than periodic backing up.

The CDBCKPT dataset is a linear VSAM datasets with a custom format so REPRO cannot be used on it. This dataset should be placed on volumes that are backed up periodically for disaster recovery using IBM's DFDSS, FDR, or DASD-specific full volume backup utilities.

If mirrored DASD is used for Business Continuation then the CDBCKPT should be placed on mirrored DASD so the utility environment can continue at the alternate site.

7.3 Restoring NGT System Datasets

7.3.1 Restoring the LOGPDS
In a disaster recovery situation when NGT datasets need to be restored the LOGPDS is easy; simply restore it from a backup volume or redefine it. The mini dumps kept in the LOGPDS are not critical to executing utilities; they are only for diagnostic purposes.

7.3.2 Restoring the CDBCKPT
In a disaster recovery situation the CDBCKPT dataset is critical to the continued execution of utilities. Restoring this dataset is best because the RTS and NGT Application information will not be lost. However because everything is restored to some prior point-in-time, utility restart will not be possible.

For restoring the CDBCKPT there are two options:

- **Restore it from backup just like the LOGPDS.** Then use the CDBDISP product to check for utility ID's that were "in-flight" (that is, in progress) at the time of the backup and resubmit any applicable utility jobs with the restart parameter set to FORCEID. This would be the normal way to restore a NGT system. **NOTE:** Always confer with BMC
Customer Support before restarting a utility with FORCEID as this could cause data loss if the utility is in a must-complete state.

- **Redefine the dataset.** Alternatively, if backups don’t exist, this dataset can be redefined as if a new install were being performed. **NOTE:** If this is done, any NGT Application definitions, NGT RTS definitions, and AMS overrides will be lost. The NGT RTS DB2 tables will be recovered and can be redefined to NGT; see the section in the *BMC Next Generation Technology Automation Reference Guide* entitled, “Creating The RTS Tables”. The NGT Application will have to be manually redefined. For further information on defining applications, see Section entitled “Applications”. The AMS override can be redefined with the CDBAMS command, see “Managing the Model AMS Define” in the *BMC Next Generation Technology General User Guide*. 

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