XCAT 2 DB2 Setup

11/09/10, 08:26:27 AM

1.0 Overview Setup DB2 on the Management Node

DB2 is supported with the xCAT 2.4 release or later.

DB2 is a product of IBM. To use it with xCAT, you will need access to a licensed version of the product, our document is for the DB2 Enterprise Server Edition (ESE) Version 9.7. We support it on AIX61 TL5 or later and Linux p-series (TBD name releases here).

xCAT 2.5 should already be installed on the Management Node following the xCAT documentations. For AIX, the xCAT 6.1 dependency packages must be installed. (put link here). These packages support Perl 5.8.8 which is installed on the required AIX level (AIX61J- AIX61 TL5 (AIX 6.1.5.0)) or later.

 The trial download of DB2 will not work with xCAT, because it does not support client accesses which is a requirement for service nodes.

Because the setup is rather complex, if you are going to use DB2 with xCAT, contact the xCAT development team, and we will work with you.

In this scenario, you will install the OS on your Management node, service node(s), setup the DB2 Client and then update the service node with the xCAT software.

Note: xCAT supports open source databases MySQL and Postgresql on Linux and AIX. Postgresql on AIX is xCAT 2.5 or later. There are setup docs for each of these databases on the xCAT web, and an automated setup script for MySQL (xCAT 2.3.3 or later) and Postgresql (xCAT 2.5 or later) .

One reason to migrate from the default SQLite database to DB2 with xCAT is for xCAT hierarchy using Service Nodes. DB2 provides the ability for remote access to the xCAT database on the Management node which is required by Service Nodes. SQLite does not support remote access to the database. MySQL, Postgresql and DB2 do provide this service. Refer to the xCAT Service Node documentation for more information.

Other programs or scenarios within your environment may also benefit from or require DB2. This document contains steps to install DB2, configure the server and client, create a database and populate it with your xCAT data.

Before using this document, you should have a general understanding of DB2. If necessary, review the installation and tutorial sections of the DB2 Product documentation.

There are many DB2 products, our documents will cover the install and setup of xCAT on DB2 Enterprise Server Edition . This product supports the full rangeof function needed by xCAT on AIX and Linux. You will have to purchase this production from IBM. This document will cover the setup of DB2 on SLES 10 SP3 or AIX 6.1, or later releases of those products on p-Series hardware. This document tested on Service Nodes with diskfull installs. Because of the size (you will need 4 gigabytes of free space disk space) of the DB2 Client that is required to

be installed on the Service Nodes, it is probably unrealistic to have diskless Service Nodes running DB2. It is also recommended not to run DB2 from an NFS mount, so using Statelite is also not a good option. Basically you should plan on having a diskfull install on any node running the DB2 client code.

For more references: see the References section.

Note: with all the DB2 commands run below, be patient. Some take several minutes to complete , and some take several seconds to return the prompt, even after they say they have completed. Never kill a command while running. It can cost you hours of recovery work. (Been there, done that).

2.0 Install DB2 on the Management Node

If you already have DB2 installed you can skip to the section Installation and Setup of DBD::DB2 Perl modules.
Obtain the DB2 Software appropriate for you OS and hardware. Save the download for the install of the Client on the Service Nodes later. Most of these directions come from the Installing Enterprise DB2 at the Product Information Center and the *Configuring and Managing BlueGene DB2 Setup Sections.* We will be using a Command Line (manual) installation method, not the Web interface.
All of the following steps must be run logged into the Management Node (xcatmn) as **root.**
Note: You must also download the DB2® license file `db2ese_o.lic` (part number C14KVEN), which you activate after installing the DB2 server.

Note: Setup of DB2 on AIX assumes that root is running ksh and on Linux bash.

2.1 Disk space needed to install DB2
 DB2 will need 4 gigabypes of disk space to download and untar the tarball and then build the product for the Server and Client code on the MN. This does not include the size of the database.
Because the DB2 source tarball is so large, you may want to untar it on a Server and have that NFS mounted to the Management Node and install it from the mount. The same is true for the Service Nodes. It will install more slowly, but you will save disk space on your MN and you do not need it on the MN after the install. Keep the source around though, because you are also going to have to install all your service nodes. The DB2 tarball contains both the Server and Client code as you will see in the instructions below.
   • To copy the tarball and unzip and untar -- at least 4 gigabytes

- To install DB2 code (MN and SN) in /opt   -- at least 1.5 gigabytes
- To create xcatdb database and instance on MN in /var – Need minimum of 465348KB to create on the MN and SN, but the database will grow on the Management Node , so I would start with 1 gigabyte on the Management Node.

For more DB2 installation requirements check the DB2 documentation at :

http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?
topic=/com.ibm.db2.luw.qb.server.doc/doc/r0025127.html

2.2 Installation Steps

1) To uncompress the image, copy the tar file or files to a temporary file system containing at least 2 gigabytes of free space, here we used **/db2source.** We will use the default install path /opt/ibm/db2/V9.7 (linux) or /opt/IBM/db2/V9.7 (AIX)   for the database,   which also must contain   2 gigabytes of free space.

2)   Untar the download package:
```
        cd /db2source
     On Linux:
       zcat  DB2_ESE_97_Linux_ipSeries.tar.gz | tar -xvf-
      or
     On AIX:
      gunzip DB2_ESE_97_AIX.tar.gz
      tar -xvf DB2_ESE_97_AIX.tar
```


3)   Additional software required:

Linux IBM VAC compiler Runtime Environment

If on Linux,
   you are going to need to install IBM XL C/C++ Advanced Edition V9.0 for Linux Runtime Environment Component for the Linux Distro, you are using. Note: the Redhat download can be used for Redhat ELS 5 or 6, the SLES download can be used for SLES 10 or 11.   Save this download for the install on the Service Nodes later.

- For our SLES 10 ppc system,   download the following: vacpp.rte.90.sles10.*.update.tar.gz into /db2source/vac9.0.
- We unzip and untar the software: zcat vacpp.rte.90.sles10.*.update.tar.gz | tar -xvf-

- Apply the updates, this installs the runtime libraries consisting of three RPMs – vacpp.rte, xlsmp.rte,and xlsmp.msg.rte.
```
cd /db2source/vac9.0
rpm -Uvh *.rpm
```

If on AIX,

There are a few lpps that are needed for DB2 that may not normally be installed.

Base AIX LPPs
bos.adt (need bos.adt.libm, bos.adt.debug, bos.adt.prof, bos.adt.syscalls)
bos.loc.com.utf
bos.loc.iso (bos.loc.iso.en_US)
bos.loc.utf.EN_US

AIX 6.1 TL4:
Minimum C++ runtime level requires the xlC.rte 9.0.0.8 and xlC.aix61.rte 9.0.0.8 (or later) filesets. These filesets are included in the June 2008 IBM® C++ Runtime Environment Components for AIX package.

AIX 7.1
Minimum C++ runtime level requires the xlC.rte 11.1.0.0 and xlC.aix61.rte 11.1.0.0 (or later) filesets.
These filesets are included in the
April 2010 IBM C++ Runtime Environment   Componets for AIXV11.1 package.

1) Install DB2

```
cd /db2source/ese
./db2_install
```

You will be prompted with the following questions:

```
Default directory for installation of products -
/opt/ibm/db2/V9.7

Do you want to choose a different directory to install
[yes/no] ?
```
  Answer: no

Specify one of the following keywords to install DB2 products.

```
ESE
CLIENT
RTCL
```

Answer: ESE

Note: you may get a warnings about "SA MP Base Component cannot be installed or updated." As long as you get no more than a warning at the end such as the following: WARNING: A minor error occurred while installing "DB2 Enterprise Server Edition" on this computer. Some features may not function correctly, followed by post setup instructions, it is ok.

2.3 Installing the DB2 License

The DB2 license file can be found in the db2/license directory on the installation CD or inside the installation directory. Depending on the product you have, the file is named db2ese.lic (Enterprise Server Edition). After installing the license, the system is ready to start the database. If you loaded a trial copy, you will be able to use it for 90 days without a license. The license will not be present in the install.

To install the license run the following command:

```
On Linux: /opt/ibm/db2/V9.7/adm/db2licm -a
   /opt/ibm/db2/V9.7/license/db2ese.lic
On AIX: /opt/IBM/db2/V9.7/adm/db2licm -a
   /opt/IBM/db2/V9.7/license.db2ese.lic
```

DBI1402I License added successfully.

2.4 Installing Latest Fix Packs

For the latest Fix Packs for all DB2 version, go to this download site.
To install fix packs you may need additional space in your DB2 install directory. For example, to install a server fix pack, you could need an additional 2 gigabytes during the upgrade.

Comprehensive instructions to install a fix pack, but see "In a nutshell" below.
http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?
topic=/com.ibm.db2.luw.admin.trb.doc/doc/t0054281.html

http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.ser
ver.doc/doc/t0024977.html

http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/topic/com.ibm.db2.luw.qb.server.doc/doc/t0024969.html

http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.qb.server.doc/doc/c0025016.html

Note for AIX 7.1, you will need Release 9.7.0.3.

In a nutshell, to upgrade to a newer PTF:

If you have Clients (Service Nodes) running, you will have to stop xcatd and stop the xcatdb instance on each Service Node, as you are doing for the Management Node below, before you start the server migration.

On the Management node:

As root
   stop the xcat daemon
   On AIX: stopsrc -s xcatd
    On Linux: service xcatd stop

As xcatdb
 su – xcatdb
 db2stop
 cd to the location of the PTF fix code

 In that directory as xcatdb run:
  ./installFixPack -b /opt/IBM/db2/V9.7   for AIX
  ./installFixPack -b /opt/ibm/db2/V9.7   for Linux

If get an error, read the error log. May suggest you use
  /installFixPack -b /opt/IBM/db2/V9.7 -f db2lib for AIX
  ./installFixPack -b /opt/ibm/db2/V9.7 -f db2lib for Linux

After complete, still as xcatdb run:
  db2start
As root:
On AIX: restartxcatd
On Linux: service xcatd start

3.0 Installation and Setup of DBD::DB2 Perl modules

3.1 perl-DBI

DBI (DataBase Interface) module and DBD::DB2 (DataBase Driver) are required on the Management Node for the xCAT code to interface with DB2.

Make sure perl-DBI is installed from the OS. Check by running:
```
rpm -qa | grep perl-DBI
```


3.2 Install the Perl DBD::DB2 code

The xCAT code uses the Perl DBD interface support for DB2.
If you are using the Database level that is documented here on AIX 6.1 L or later, or Redhat 5 or Redhat 6. **You can obtain the perl-DBD-DB2 rpm supplied by xCAT from either the AIX xCAT deps package or the Linux xCAT deps package.**

> **Note: as of Oct 2010, the AIX deps package for xCAT will automatically install the perl-DBD-DB2 , and unixODBC-* when installed on the Management or Service Nodes. You may find these already installed.**
> **For Linux, you should add the perl-DBD-DB2 rpm to otherpkgs from the Linux deps package, when installing the service node.   Also add the IBM vac runtime environment rpm, see Linux IBM VAC compiler Runtime Environment. The unixODBC should be installed from the Linux OS rpm.**

 If you can use these rpms then install them. Otherwise, follow the instructions in Building Perl DBD::DB2 code and then go to Setting up the DB2 Server Instance.

4.0 Setting up the DB2 Server Instance

You can choose to use the db2sqlsetup script, instead of following this manual process. It is available in the xCAT 2.5 release. See man db2sqlsetup.   The setup script will cover all the necessary steps for completing the process of setting up the Server and creating the xCAT database.

To use the db2sqlsetup script to setup the Server Instance and bring up xCAT running on DB2, run the following command. You will be prompted for the instance password.

```
db2sqlsetup -i -S -V

in addition, if you have c,C++ applications such as LoadLeveler
    then setup the ODBC by running
```

```
    db2sqlsetup – o -S
```

If you use the db2sqlsetup script can skip to the section Setting up the DB2 Client on the Service Nodes.

On the DB2 Server, the Management Node :This section takes you through the creation of the the DB2 Server Instance. The Server Instance will be called xcatdb. For more information on what is an Instance and what part it plays in DB2, read the following DB2 information.
 All of the following steps must be run logged into the Management Node as root.

   1) Create a xcatdb user id and group for the DB2 instance. The home
      directory for the instance will be in /var/lib/db2.

   On AIX:

    mkgroup xcatdb
    mkuser pgrp='xcatdb' home='/var/lib/db2' shell='/bin/ksh' xcatdb

   On Linux:

         groupadd xcatdb

       useradd -d /var/lib/db2 -g xcatdb -m -s /bin/bash xcatdb

   2) Set the xcatdb password
         On AIX
          chpasswd -c
         xcatdb:<passwd>
         ctl-D

            On Linux

         chpasswd
         xcatdb:<passwd>
         ctl-D

         Note: we use the chpasswd command so the password will not
         have to be changed the first time we use the xcatdb userid.

   3) Add the following entry into /etc/services

      Edit the /etc/services file and add the following (suggestion: insert above the
      references section)

      #
      # xcatd settings : Allow tcp communication for the instance, make sure port
```

numbers do not conflict with existing entries.
```
#
DB2_xcatdb   60000/tcp
DB2_xcatdb_1   60001/tcp
DB2_xcatdb_2   60002/tcp
DB2_xcatdb_END 60003/tcp
db2c_xcatdb   50001/tcp   # Port for server connection
```

## 4) Create the DB2  Server Instance

Note: you will need available  space  in /var/lib/db2 is 465348KB, for this to complete.

To create the xCAT DB2 Server Instance run the following as root:

on Linux

/opt/ibm/db2/V9.7/instance/db2icrt **-a server -p** db2c_xcatdb **-s ese -u** xcatdb xcatdb

on AIX

/opt/IBM/db2/V9.7/instance/db2icrt **-a server -p** db2c_xcatdb **-s ese -u** xcatdb xcatdb

## 5) Modify the DB2 Server Instance

As root:
```
cd /opt/ibm/db2/V9.7/instance on Linux
cd /opt/IBM/db2/V9.7/instance on AIX
```
./db2iset -g DB2_PARALLEL_IO=*
./db2iset -g DB2AUTOSTART=yes
./db2iset -g DB2_STRIPED_CONTAINERS=ON

su – xcatdb
>export EXTSHM=ON
>**db2set DB2ENVLIST=EXTSHM**
> db2set -all
[e] DB2LIBPATH=/var/lib/db2/sqllib/java/jdk64/jre/lib/ppc64
[i] DB2ENVLIST=EXTSHM
[i] DB2COMM=tcpip
[i] DB2AUTOSTART=YES
[g] DB2FCMCOMM=TCPIP4
[g] DB2_STRIPED_CONTAINERS=ON
[g] DB2SYSTEM=c68m4mn11.ppd.pok.ibm.com
[g] DB2INSTDEF=xcatdb
[g] DB2_PARALLEL_IO=*
[g] DB2AUTOSTART=yes

6) Extend the number of shared memory segments allowed.
Add the following line to /var/lib/db2/sqllib/db2profile
Note: you will need to add this export for all ID's that access the database.

    EXTSHM=ON
    export EXTSHM

7) Set the db2  environment variables for root
For AIX as root:
    vi /etc/profile
    add the following lines:
     export DB2INSTANCE=xcatdb
    export EXTSHM=ON


For Linux as root:
    cd /etc/profile.d
    vi xcat.sh
      add the following line:
      export DB2INSTANCE=xcatdb
      export EXTSHM=ON

    vi xcat.csh
      add the following line:
      setenv DB2INSTANCE "xcatdb"
      setenv  EXTSHM "ON"

Note: either logout and back in or  set the environment variable manually for root:
    export DB2INSTANCE=xcatdb

## 5.0 Start the DB2 Server

To start the server,  you must logon as the xcatd instance id,  create previously.

```
su – xcatdb
xcatdb@c76a3l4vp01:~> db2start
01/27/2010 19:48:08     0   0   SQL1063N  DB2START processing was
   successful.
SQL1063N  DB2START processing was successful.

If you need to stop the database,  use
xcatdb@c76a3l4vp01:~> db2stop
or
xcatdb@c76a3l4vp01:~> db2stop force
```

5.1 Increasing processor entitlement

After the database is started, you might want to increase the processor entitlement for DB2.   Check the section "Increasing processor entitlement" for information on customizing you system.

5.2   Useful DB2 Commands

Note: path IBM for AIX, ibm for Linux
These commands, you run as root:

- Remove an instance:/opt/ibm/db2/V9.7/instance/db2idrop xcatdb
- If you have problems removing an instance use:
  /opt/ibm /db2/V9.7/instance/db2iset -d xcatdb
- Show all instances:/opt/ibm/db2/V9.7/instance/db2ilist

These command, you run as xcatdb:

- db2 connect to xcatdb (connect to database) from Server
- db2 connect to xcatdb user xcatdb from Client
- db2 drop database xcatdb (drop the database)
- db2 list tables
- db2 * from site
- db2 select * from monsetting WHERE \(\"name\" like \'rcmon\'\)
  and   \(\"disable\" is NULL \)
- db2 select \"node\" from nodelist **WHERE \"disable\" is NULL OR \"disable\" LIKE
  \'0\' OR \"disable\" LIKE \'no\' OR \"disable\" LIKE \'NO\' OR \"disable\"
  LIKE \'nO\'**
- db2 describe table site
- db2 list tablespaces
- db2 drop table site
- db2stop
- db2stop force
- db2start
- db2licm -l
- db2level   (show current release/ptf level)
- db2 (enter interactive admin session)
- db2 -t (enter interactive admin session where sql must end in ;)
- db2 get db cfg (get database configuration)
- db2 update dbm cfg using MON_HEAP_SZ AUTOMATIC
- db2 list node directory
- quit (quit out of interactive admin session)
- As root, to re-setup **/etc/inittab entry for DB2**, run
  /opt/IBM/db2/V9.7/bin/db2fmcu -u -p /opt/IBM/db2/V9.7/bin/db2fmcd

6.0 Setup Database Manager

We will update the DBM (Database Manager) with our
configuration parameters

```
su – xcatdb
```

In your xCAT install /opt/xcat/share/xcat/tools/updateDBM.sql , is a script that
you can run to set the needed parmeters.   Run the following:

db2 -tvf /opt/xcat/share/xcat/tools/updateDBM.sql

7.0 Create the xCAT Database

We will create one database "xcatdb", it will be store in the "xcatdb" Instance home
directory which is /var/lib/db2.

su – xcatdb

In your xCAT install /opt/xcat/share/xcat/tools/createdb.sql, is a script that you
can run to create the xcatdb database.   Run the following:

db2 -tvf /opt/xcat/share/xcat/tools/createdb.sql

Note: be patient, it takes a while. You may also investigate the default attributes
of the database that we chose in this setup scripts and change according to
your system needs.

7.1 Restart the Instance to Apply the Changes

```
su – xcatdb ( if not already there)
db2 connect reset
db2 force applications all; db2 terminate;
db2stop
db2start
```

```
db2iauto -on xcatdb  ( will auto restart on reboot)
exit
```

8.0 Migrate xCAT data to DB2

If you are using the db2sqlsetup script , this section will automatically be done for you. See man db2sqlsetup. And you can go to "Test the database".

1. You must backup your xCAT data before populating the DB2 database. There are required default entries that were created in the SQLite database when the xCAT RPMs were installed on the Management Node, and they must be migrated to the new DB2 database.

    mkdir -p ~/xcat-dbback
    dumpxCATdb -p ~/xcat-dbback

    Note: if you get an error, like "Connection failure: IO::Socket::SSL: connect: Connection refused at....," make sure your xcatd daemon is running.

2. **Creating the /etc/xcat/cfgloc file** tells xcat what database to use. If the file does not exists, it uses by default SQLite, which is setup during the xCAT install by default. The information you put in the files, corresponds to the information you setup when you configured the database. Create a file called */etc/xcat/cfgloc* and populate it with the following line:

    DB2:xcatdb|xcatdb|ppslab09

    DB2:<databasename>|<instancename>|<instancepassword>

    The first variable is the database name xcatdb that was setup. The second variable is the name of the Instance.   The password must match the password of your DB2 Instance "xcatdb" userid.

    Finally change permissions on the file, so only root can read, to protect the password.

    chmod 0600 /etc/xcat/cfgloc

3. Stop the xcatd daemon, so no database actions will occur while you are migrating the data to DB2.
     On AIX: stopsrc -s xcatd
     On Linux: *service xcatd stop*

4. Restore your database to DB2. Use bypass mode to run the command because the daemon is no longer running. This can take a while.

XCATBYPASS=1 restorexCATdb -p ~/xcat-dbback

Note: If you still have errors that you can not resolve, you can go back to using SQlite, by moving /etc/xcat/cfgloc to /etc/xcat/cfgloc.save and restarting xcatd.

5. Start the xcatd daemon using the DB2 database.

   On AIX: startsrc -s xcatd
   On Linux: *service xcatd restart*

6. *Test the database*

   tabdump site

9.0 Setting up the DB2 Client on the Service Nodes.

9.1 Installing the DB2 Client software on the SN

Now that the DB2 database is setup on the Management node , if you have not done so, install xCAT on the Service Node.
Use the following references for setting up to install xCAT on your Service Nodes:
   - [Setting up Hierarchy in xCAT](#)
   - [Setting up an AIX Hierarchical Cluster](#)

9.2 Automatic install of DB2 and Client setup on SN

As of xCAT Release 2.5, the unixODBC and perl-DBD-DB2 rpm will be automatically installed with the AIX xCAT deps package on the Service Node when you installed xCAT.

For Linux, you should add the perl-DBD-DB2 rpm to otherpkgs from the Linux deps package, when installing the service node. Also add the IBM vac runtime environment rpm, see Linux IBM VAC compiler Runtime Environment. The unixODBC should be installed from the Linux OS rpm.

As of xCAT2.6 , we have additionally added the automatic install and configuration

of the DB2 client and ODBC on the service nodes following this process:

1) **Give access to the DB2 code to the Service Node during install**

   The site.db2installloc attribute must point to a directory that can be mounted by the ServiceNode that contains the DB2 ESE 9.7.03 code extracted.

   The DB2 tarball should be extracted into a read/mountable directory on either the Management Node or some server that can be mounted by the Service Node after it is installed when running the post install scripts. The location will be put in a site attribute called db2installloc. For example,

   site.db2installloc = /mntdb2 , if on the Management Node

   site.db2installloc = servername:/mntdb2 , if on some other server

   In ether case, the db2 code will be extracted and placed in /mntdb2

   The /mntdb2 directory will look something like this, where ese is the top directory containing all the db2 install code.

   ```
   ls /mntdb2
   ese
   ```

2) **Run db2install and odbcsetup postscripts to the Service Node during install**

   In xCAT 2.6, To automatically install DB2, Configure the Client and setup the ODBC, modify your postscripts servicenode entry as follows:

   On Linux:

   #node,postscripts,postbootscripts,comments,disable

   "xcatdefaults","syslog,remoteshell,syncfiles","otherpkgs",,

   "service","**db2install**,servicenode,xcatserver,xcatclient,**odbcsetup**",,,

   On AIX:

   #node,postscripts,postbootscripts,comments,disable

   "xcatdefaults","syslog,aixremoteshell,syncfiles","otherpkgs",,

   "service","**db2instal**l,servicenode,**odbcsetup**",,,

9.3 Manual install of DB2 and Client setup on the SN

If did not use the automatic setup process detailed in Automatic install of DB2 and Client setup on SN, then
 you need to install the DB2 client manually. Otherwise, just go to the Test the Database Connection section.

Follow the instructions in Install DB2 on the Management Node, to install the DB2 code on your Service Node (SN), up to the point Install DB2 where you actually install DB2. You are only going to install the Client on the SN.   Note you probably do not have to download the DB2 code again, if you have saved the downloads from the Server install.

Note: the disk space needed as documented in 3Disk space needed to install DB2 .

Install DB2:

```
cd /db2source/ese
./db2_install
```

You will be prompted with the following questions:

```
Default directory for installation of products -
/opt/ibm/db2/V9.7

Do you want to choose a different directory to install
[yes/no] ?
```
  Answer: no

Specify one of the following keywords to install DB2 products.
```
ESE
CLIENT
RTCL
```

Answer: CLIENT

Manual Installation and Setup of DBD::DB2 Perl modules on the SN

If you are using the Database level that is documented here on AIX 6.1 L or later, Redhat 5 or Redhat 6. **You can obtain the perl-DBD-DB2 rpm supplied by xCAT from either the AIX xCAT deps package or the Linux xCAT deps package** and skip this section and go to Manually creating the Client Instance on the Service Node.

> **Note: xCAT 2.5 , the deps package for xCAT will automatically install the perl-DBD-DB2 , and unixODBC-* when installed on the Management or Service Nodes. You may find these already installed. You can check if they are installed, by running rpm -qa | grep DB2.**

As you did on the Management Node (MN), the Perl DB2 DBD will have to be installed on all Service nodes. If your Service Nodes are at the same OS level as your Management node, you can mount the directory from the MN to the Service Node and just run the install. Note: extra instructions for updating /etc/ld.so.conf for Redhat 6 in Installation and Setup of DBD::DB2 Perl modules.

For installing the DBD:DB2 DBI from a mount:

On the MN:

export ~/DBD read-only

On the SN:

mkdir /mnt2

mount xx.xxx.xxx.xxx:~/DBD   /mnt2

cd /mnt2/DBD-DB2-1.78

make test (if no errors continue with the make install)

make install

unmount or umount /mn2

For installing the DBD:DB2 DBI from the source code:

Follow the instructions in Installation and Setup of DBD::DB2 Perl modules.

Manually creating the Client Instance on the Service Node

You can choose to use the db2sqlsetup script, instead of following this manual process. It is available in the xCAT 2.5 release. See man db2sqlsetup. It will automatically setup the client.

To use the db2sqlsetup command to create the client instance, run

```
db2sqlsetup -i -C -V
You will be prompted for the instance password and address of the
   DB2 server that this node can access.   The instance password
   must match what was assigned on the DB2 server to the
   instance. Normally,  the address is the value in site.master
   on the Management Node, if you DB2 server is on the Management
   Node.
```

After you finish running the script to setup the client, you can proceed to Test the Database Connection .

This section takes you through the creation of the the DB2 Client Instance on the Service Node. The Client Instance will be called xcatdb.
 For more information on what is an Instance and what part it plays in DB2, read the following DB2 information.

 All of the following steps must be run logged into the Service Node as root.

1) Create a xcatdb user id and group for the DB2 client instance. The home directory for the instance will be in /var/lib/db2 as on the MN.

   On AIX:

   ```
   mkgroup xcatdb
   mkuser pgrp='xcatdb' home='/var/lib/db2'
   shell='/bin/ksh'  xcatdb
   ```

   On Linux:

   ```
   groupadd  xcatdb
   useradd -d /var/lib/db2 -g xcatdb  -m -s
   /bin/bash xcatdb
   ```

2) Set the xcatdb password

       On AIX
       chpasswd -c
xcatdb:<passwd>
ctl-D

       On Linux

chpasswd
xcatdb:<passwd>
ctl-D

Note: we use the chpasswd command so the password will not have to be
changed the first time we use the xcatdb userid.

3) Add the following entry into /etc/services on the Service Node

Edit the /etc/services file and add the following (suggestion: insert above the
references section)

note this must match what is in /etc/services on the Management/DB2 Server.
Again make sure matching port is not used on both machines.

db2c_xcatdb   50001/tcp # Port for DB2 Server Connect

4) Create the DB2 Client Instance
To create the xCAT DB2 Client Instance run the following:

On Linux:
/opt/ibm/db2/V9.7/instance/db2icrt -s client xcatdb
On AIX:
/opt/IBM/db2/V9.7/instance/db2icrt -s client xcatdb
5) Update the Client Instance

   su – xcatdb
   >export EXTSHM=ON
   >db2set DB2ENVLIST=EXTSHM

6) Extend the number of shared memory segments allowed.
Add the following line to /var/lib/db2/sqllib/db2profile
Note: you will need to add this export for all ID's that access the database.

EXTSHM=ON
export EXTSHM

7) Set the db2 environment variables for root
For AIX as root:
vi /etc/profile
add the following lines:
export DB2INSTANCE=xcatdb
export EXTSHM=ON

For Linux as root:
cd /etc/profile.d
vi xcat.sh
add the following line:
export DB2INSTANCE=xcatdb
export EXTSHM=ON

vi xcat.csh
add the following line:
setenv DB2INSTANCE "xcatdb"
setenv EXTSHM "ON"

Note: either logout and back in or set the environment variable manually for root:
export DB2INSTANCE=xcatdb; export EXTSHM=ON

Manually creating the catalog of the DB2 Server Node on the Service Node

Now we will setup the Client on the Service Node to access the database on the Management Node (mn) using xcatdb instance on the Service Node:


```
su – xcatdb
```

db2 catalog tcpip node mn remote 9.114.113.203 server db2c_xcatdb
(note: port must match what is in /etc/services)
db2 terminate (refreshes cache)

to check run db2 list node directory:

db2 list node directory

Node Directory

Number of entries in the directory = 1

Node 1 entry:

```
Node name              = MN
Comment                =
Directory entry type     = LOCAL
Protocol              = TCPIP
Hostname              = 9.114.113.203
Service name            = db2c_xcatdb
```

Note: 9.114.113.203 must be an address or resolvable hostname that the Service Node can access the Management Node.

Manually Catalog the Server Instance Database on the Service Node

Next on the Service Node, we will catalog the xcatdb database and it's location on the mn.

su – xcatdb (if not already there)
db2 catalog db xcatdb as xcatdb at node mn
db2 terminate (refreshes cache)

```
For more information: See
http://publib.boulder.ibm.com/infocenter/db2luw/v8/index.jsp?
topic=/com.ibm.db2.udb.doc/core/r0001944.htm
```

9.4   Test the Database Connection

```
su – xcatdb (if not already there)
```

```
    db2 connect to xcatdb user xcatdb
```

You will be prompted for xcatdb's password. After entering it you should see something similar to this:

Database Connection Information Database server = DB2/LINUXPPC64 9.7.1
 SQL authorization ID = XCATDB
 Local database alias = XCATDB

Close the connection with -

```
    db2 connect reset
    exit
```

9.5   Start the xCAT daemon

If the service node has xCAT installed, you can not start the xcatd daemon
  On AIX: restartxcatd
  On Linux: service xcatd start

10.0 Adding ODBC support

You only need to follow the steps in this section on adding ODBCsupport, if you plan to develop C, C++ database applications on the database or run such applications (like LoadLeveler) using the Database. Otherwise skip to the next section Error: Reference source not found.

More information about the IBM DB2 Driver for ODBC and CLI is found in

http://publib.boulder.ibm.com/infocenter/db2luw/v9/index.jsp?
topic=/com.ibm.db2.udb.apdv.cli.doc/doc/c0023378.htm

10.1 Setup the ODBC on the Management Node (DB2 Server)

On AIX: You need the *unixODBC* packages

included in the *dep-aix-xxxx.tar.gz* file. The *.gz* file was download when the xCAT Management Node was setup. To install the package, go to the directory where the gz file was untared and use the following command:

rpm -i unixODBC-*

As of xCAT 2.5 or later, you can use db2sqlsetup command in xCAT to perform

the ODBC setup operations below. See manpage for db2sqlsetup.

To setup the ODBC on the MN using db2sqlsetup, run the following command. You must be in a writeable directory to run the command, because it will need to create a file to the current directory.

    db2sqlsetup -o -S -V

 After using the db2sqlsetup script you can move on to Setup ODBC on the Service Nodes.

1. To Setup the ODBC manually .

On AIX:

When a new a new DB2 instance is created on AIX, DB2 places a copy of the ODBC DB2 driver into the database instance directory: <DB2INSTANCE_HOME>/sqllib/lib/libdb2.a, where in our process <DB2INSTANCE_HOME> is /var/lib/db2.

The unixODBC Driver Manager loads the DB2 Driver dynamically so the shared object must be extracted from the driver. To do this use the following commands:

cd /var/lib/db2/sqllib/lib

ar -x libdb2.a

This produces a shr.o. Rename this file to libdb2.so.

mv shr.o libdb2.so

On Linux: The unixODBC package come as part of the OS.   Refer to

xCAT Top Doc for how to get packages from the distro.

rpm -i unixODBC-*

2. To configure ODBC you need to make changes to the *odbcinst.ini and odbc.ini* files so that ODBC works with the xCAT database. First update the *odbcinst.ini* file with the correct driver name.

On AIX:

For the Driver, enter the path name of the shared object you created:

vi /etc/odbcinst.ini
```
[DB2]
Description = DB2 Driver
Driver = /var/lib/db2/sqllib/lib/libdb2.so
FileUsage = 1
DontDLClose = 1
Threading = 0
```

On RH and Fedora:

For the Driver, enter the path name of the shared object from the OS:

vi /etc/odbcinst.ini
```
[DB2]
Description = DB2 Driver
Driver = /var/lib/db2/sqllib/lib/libdb2o.so
FileUsage = 1
DontDLClose = 1
Threading = 0
```

On SLES: (TBD, if supported)

vi /etc/unixODBC/odbcinst.ini
```
[DB2]
```

```
Description = DB2 Driver
Driver = /var/lib/db2/sqllib/lib/libdb2o.so
FileUsage = 1
DontDLClose = 1
```
Threading = 0

Then update the *obdc.ini* files with the DSN information for ODBC. Use
DATABASE instance name and database as defined in the /etc/xcat/cfgloc file. In
our process they are the same.

On AIX, (Redhat to be tested):

vi /etc/odbc.ini

```
[xcatdb]
Driver = DB2
DATABASE = xcatdb
```


On SLES (to be tested. If supported)

vi /etc/unixODBC/odbc.ini

```
[xcatdb]
Driver = DB2
DATABASE = xcatdb
```


3. Put the instancename and password for xcatdb database on the root's home
directory so that user root will not have to specify them when accessing the
database through ODBC. The DATABASE, instancename and
PASSWORD must match was put in the */etc/xcat/cfgloc* file.

v*i ~/.odbc.ini*

```
[xcatdb]
DATABASE = xcatdb
USER = xcatdb
PASSWORD = xcat20l
```

Update the permissions for root only read of the file.

chmod 0600 .odbc.ini

10.2 Setup ODBC on the Service Nodes

Skip this step, if there are no service nodes in the cluster.

Now that the DB2 database is setup, if you have not done so, install xCAT on the Service Node. As of xCAT release 2.6 you can also automatically install and setup DB2 on your service nodes during the xCAT Service Node install process by adding two postscripts (db2install and odbcsetup) to you service node postscript list.
Use the following references for setting up your Service Nodes:
 • Setting up Hierarchy in xCAT
 • Setting up an AIX Hierarchical Cluster

In xCAT 2.6, you can automatically setup the ODBC on the servicenodes during the install by following the instructions in Automatic install of DB2 and Client setup on SN.

If you are not at 2.6, then you will need to manually setup the DB2 client and ODBC on the Service Nodes, following these instructions:

 You may need to manually install the unixODBC and the perl-DBD-DB2 driver on the Service nodes and modify the ODBC configuration files just as we did in step 1 and 2. To do this, you should have already installed and setup the DB2 Client code on the Service Nodes as documented in Setting up the DB2 Client on the Service Nodes.

Install the DB2 driver into the same directory as on the management node, so the odbcinst.ini file can be the same on the management and service nodes..

xCAT has utilities to install additional software on the nodes. To install ODBC on to the service nodes, refer to the following documents for details:

AIX: *xCAT2onAIXUpdates.pdf*

Linux: xCAT2-updatenode.pdf

If **the Service Node is already installed with xCAT 2.5+, you can use the db2sqlsetup script to setup your service nodes on the service node, instead of the following manual steps.**

To setup the ODBC on the SN using db2sqlsetup, run the following command. You must be in a writeable directory to run the command, because it will need to create a file to the current directory.

db2sqlsetup -o -C -V

If you use the db2sqlsetup routine on the Service Node, you can skip to Test the ODBC connection.

To setup the ODBC configuration files, just sync the files to the service nodes from the ones setup on the Management Node.

The service in the following command is the node group name for all the service nodes.

On AIX:

xdcp service -v /etc/odbcinst.ini /etc/odbcinst.ini

xdcp service -v /etc/odbc.ini /etc/odbc.ini

xdcp service -v /.odbc.ini /.odbc.ini

On RH and Fedora:

xdcp service -v /etc/odbcinst.ini /etc/odbcinst.ini

xdcp service -v /etc/odbc.ini /etc/odbc.ini

xdcp service -v /root/.odbc.ini /root/.odbc.ini

On SLES

xdcp service -v /etc/unixODBC/odbcinst.ini /etc/unixODBC/odbcinst.ini

xdcp service -v /etc/unixODBC/odbc.ini /etc/unixODBC/odbc.ini

xdcp service -v /root/.odbc.ini /root/.odbc.ini

You will have to setup one additional file on the Service Node(client):

If /var/lib/db2/sqllib/cfg/db2cli.ini exists then

cp /var/lib/db2/sqllib/cfg/db2cli.ini /var/lib/db2/sqllib/cfg/db2cli.ini.org

then whether it exists or not

vi /var/lib/db2/sqllib/cfg/db2cli.ini

Add the following stanza:

[xcatdb]

uid=xcatdb

pwd=xcat201

chown xcatdb /var/lib/db2/sqllib/cfg/db2cli.ini

chmod 0600 /var/lib/db2/sqllib/cfg/db2cli.ini

5. Test the ODBC connection.

On AIX, as root: */usr/local/bin/isql -v xcatdb*

or as non-root user: */usr/local/bin/isql -v xcatdb xcatdb <passwd>*

On Linux, as root: */usr/bin/isql -v xcatdb*

or as non-root user: */usr/bin/isql -v xcatdb xcatadmin xcat201*

/usr/local/bin/isql -v xcatdb

```
+--------------------+
| Connected! |
| |
| sql-statement |
| help[tablename] |
| quit |
+--------------------+
SQL> LIST  TABLES;
+--------------------+
| Tables_in_xcatdb |
|--------------------|
| . |
| networks |
| nodelist |
| site |
| . |
| . |
+--------------------+
SQL> DESCRIBE table site;
+----------+--------------+------+-----+---------+-------+
| Field | Type | Null | Key | Default | Extra |
```

```
+----------+--------------+------+-----+---------+-------+
| key | varchar(128) | NO | PRI | | |
| value | text | YES | | NULL | |
| comments | text | YES | | NULL | |
| disable | text | YES | | NULL | |
+----------+--------------+------+-----+---------+-------+
```

SQL > quit;

11.0 Migrating to AIX 7.1

AIX 7.1 uses a new level of Perl (5.10.1). A new level for AIX 7.1 of the perl-
DBD rpm for MySQL must be installed to replaced the AIX 6.x rpm that was
installed previously.

During the migration:
 the xcatd daemon should be stopped.

After the OS migration:
The new perl-DBD rpm can be obtained from the xcat deps package on the web:

- Download the latest xCAT AIX deps package package, go to the 7.1
  subdirectory
- rpm -Uvh perl-DBD-DB2-1-2.aix7.1.ppc.rpm
- start the xcatd daemon

12.0 Removing xCAT from DB2

To remove the database, first back it up.

mkdir -p ~/xcat-dbback
dumpxCATdb -p ~/xcat-dbback

1. stop the xcatd daemon

2. Now remove the database.

 su – xcatdb

 >*db2 force application all*

 >*db2iauto -off xcatdb*

 >*db2 drop database xcatdb*

1. remove /etc/xcat/cfgloc file (points xCAT to DB2)

2. Install the DB2 database into SQLite

 XCATBYPASS=1 restorexCATdb -p ~/xcat-dbback

3. start xcatd

13.0 Removing DB2 from MN and SN

To remove DB2 from your MN and Service Node after removing xCAT from the DB, do the following: (note path is IBM for AIX, ibm for Linux)

On the Service Node as root:

1) Stop the xcatd daemon
2) Remove the instance: (if will not remove, su – xcatdb on the MN and db2stop, then try again).
   /opt/IBM/db2/V9.7/instance/db2idrop xcatdb
3) Check to see if no instance:
   /opt/IBM/db2/V9.7/instance/db2ilist

4) Remove the DB2 (this takes a while and removes the db2 installed):
   /opt/IBM/db2/V9.7/install/db2_deinstall -a
5) Make sure /opt/IBM/db2/V9.7 is empty if you want to install db2 again
6) remove instance port from /etc/services
   vi /etc/services
   delete entry: db2c_xcatdb1   50001/tcp   # Port for server connection
7) remove xcatdb user and xcatdb group
8) rm -rf /var/lib/db2/*
9) remove export DB2INSTANCE=xcatdb and export EXTSHM=ON from /etc/profile on AIX, or /etc/profile.d/xcat.sh or xcat.csh on Linux.

On the Management Node

1) stop the xcatd daemon
2) su – xcatdb
3) remove the database
    db2 drop database xcatdb
4) stop db2
    db2stop
5) **as root perform the remainder of these steps (example AIX path)**
6) Remove xcatdb instance
   /opt/IBM/db2/V9.7/instance/db2idrop xcatdb

7) Check to see if no xcatdb instance
    /opt/IBM/db2/V9.7/instance/db2ilist
8) Remove DB2 , if you want to deinstall DB2 (this takes a while, this removes
   the DB2 install)
    /opt/IBM/db2/V9.7/install/db2_deinstall -a
9) Make sure /opt/IBM/db2/V9.7 is empty, or you will not be able to install
   DB2 there again.
10) Remove xcat entries in /etc/services
   # xcatdb db2 entries
   DB2_xcatdb_END 60003/tcp
   db2c_xcatdb   50001/tcp   # Port for server connection

11) remove xcatdb user and xcatdb group
12) rm -rf /var/lib/db2/*

1) remove export DB2INSTANCE=xcatdb and export EXTSHM=ON from
   /etc/profile on AIX, or /etc/profile.d/xcat.sh or xcat.csh on Linux.

14.0 References

- *Configuring and Managing BlueGene DB2 Setup Sections*
- *MySQL to DB2 migration*
- *Setting up the DB2 Client*
- *DB2 Survival Guide*
- *DBD:DB2 pod*
- *DB2 Deployment Guide*
- *DB2 Perl Database Interface*
- *DBI mail archives*

- *Perl Progamming with DB2*
- *Quick Beginnings for DB2*

15.0 Diagnostics

1) "Total Environment Allocation Failure" when running xCAT command to the database, such as tabdump.
   echo $DB2INSTANCE should be xcatdb
   Usually loss of critical DB2 Env Var settings for the following:

   > DB2INSTANCE=xcatdb (most important)
   > CUR_INSTHOME=/var/lib/db2
   > DB2DIR=/opt/ibm/db2/V9.7
   > INSTHOME=/var/lib/db2
   > See:http://www.perlmonks.org/?node_id=682626

   > See: Set the db2 environment variables for root

1) Set diagnostics level in database
   You can up the diagnotics level and watch for database errors in the ~/sqllib/db2dump/db2diag.log and xcatdb.nfy under the xcatdb instance home directory on the DB2 Server.
   Run the following to increase the diagnostics level. Note: this should be set back to level 3 after diagnosing the problem, because it affects DB performance.

   ```
   On the MN:
       stop the xcat daemon (stopsrc -s xcatd, or service xcatd
       stop)
       su - xcatdb
       db2 update dbm cfg using diaglevel 4
       db2stop
       db2start
   ```

16.0 Appendix A:Building Perl DBD::DB2 code

If you cannot use the **perl-DBD-DB2 rpm** supplied by xCAT and must build your own, that is you are using a different version of DB2 or not Redhat 5 or 6 Linux, then you must build your own perl DBD::DB2 code .

The level we have tested with is 1.78. If you have an older version, upgrade to 1.78. Some of the older versions do not support the function needed by xCAT. If you have 1.78 installed you can move on to Setting up the DB2 Server Instance.
For the build and installation of the Perl DBD::DB2 module follow the instructions below. You can read information about the Perl interface to DB2 at this site.

http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21297335
or
http://www-01.ibm.com/support/docview.wss?rs=71&uid=swg21297335

You will download the latest DBD:DB2 source code from CPAN.

Note on AIX: you must install the VAC C/C++ compiler, on Linux gcc compiler

We will then compile and install it on your machine with the DB2 database you have
installed.

```
mkdir ~/DBD
cd ~/DBD
download the current DBD source  into ~/DBD
wget http://search.cpan.org/CPAN/authors/id/I/IB/IBMTORDB2/DBD-DB2-1.78.tar.gz


If wget is not available, ftp the file to the directory.
zcat DBD-DB2-1.78.tar.gz | tar -xvf-
cd ~/DBD/DBD-DB2-1.78
```


Build and install the Perl DBD:

On Linux:
on Redhat5
```
  DB2_HOME=/opt/ibm/db2/V9.7 DB2LIB=/opt/ibm/db2/V9.7/lib32 perl
    Makefile.PL
```

on Redhat6
```
   DB2_HOME=/opt/ibm/db2/V9.7 DB2LIB=/opt/ibm/db2/V9.7/lib64 perl
Makefile.PL
   vi /etc/ld.so.conf
   add the following line
   /opt/ibm/db2/V9.7/lib64
   run ldconfig
```


on SLES
```
  DB2_HOME=/opt/ibm/db2/V9.7 DB2LIB=/opt/ibm/db2/V9.7/lib64 perl
    Makefile.PL
```

On AIX:
```
  DB2_HOME=/opt/IBM/db2/V9.7  perl Makefile.PL
```

For both AIX and Linux:

```
  make  ( on Linux you will get warnings)
  make test
  make install (if the tests look okay)
```

Note: if you are using perl 5.8.8 on AIX (AIX61J -   AIX61 TL5 (AIX 6.1.5.0)

```
    /usr/bin/perl -> /usr/opt/perl5/bin/perl5.8.8
```

 The **make** may fail.   Contact the xCAT development team.   There is
most likely a different Config.pm file needed in
/usr/opt/perl5/lib/5.8.8/aix-thread-multi/ to produce the correct
Makefile when running perl Makefile.PL.

The generated Makefile that is correct has the following line in it:
CDLFLAGS = -bE:/usr/opt/perl5/lib/5.8.8/aix-thread-
multi/CORE/perl.exp -bE:/usr
/opt/perl5/lib/5.8.8/aix-thread-multi/CORE/perl.exp
-bE:/usr/opt/perl5/lib/5.8.8
/aix-thread-multi/CORE/perl.exp -bE:/usr/opt/perl5/lib/5.8.8/aix-
thread-multi/CORE/perl.exp

If the make does not fail and the Makefile looks correct, continue
using the 5.8.8 Makefile.