XCAT 2.x MySQL Setup

Date: 10/24/2009

1.0 Switch to the MySQL database on the Management Node

The xCAT support for Service Nodes requires a database with remote access capabilities. The MySQL database is provided for this purpose. You must be running the xCAT 2.1 or later code to use MySQL.

1.1 Install MySQL

On AIX:

The xCAT RPM called xcat-mysql is provided as a convenience to help simplify the installation of MySQL on an AIX system. This RPM is available at
https://sourceforge.net/projects/xcat/files/
Download x*cat-mysql-2.*.gz*.

To install the packages use the following commands:

> *gunzip xcat-mysql-2*.gz*
> *tar -xvf xcat-mysql-2*.tar*
> *./instmysql*

The *xcat-mysql* post processing will automatically unwrap MySQL in the /usr/local directory and will create a link for /usr/local/mysql. I will also update the PATH environment variable in the /etc/profile file.

On Linux:

MySQL comes as part of the OS.   Insure that the following rpms are installed on
your Management Node:
perl-DBD-MySQL*
mysql-server-5.*
mysql-5.*
mysql-devel-5.*
mysql-bench-5.*
mysql-5.*
mysql-connector-odbc-*
mysql-devel-5.*

1.2 Configure MySQL

To set up the MySQL database on the Management Node follow these steps.
(See http://dev.mysql.com/doc/refman/5.1/en/installing-binary.html for additional
details.)

This example assumes:

- mn20: hostname of management node
- xcatdb: database name
- mysql: database role (aka user)
- xcatadmin database user id used by xCAT for access
- xcat201: database password for xcatadmin

Substitute your addresses and desired database administration, password and
database name as appropriate.

On AIX: The example assumes that **mysql** it was installed in */usr/local and
commands and the database is under /usr/local/mysql directory.*
On Linux: mysql is already installed in /usr/bin and the database is in /var/lib/mysql
(tested on Redhat).
Set your paths accordingly.

1. For AIX, add a login user and group for **mysqld** (this is probably already
    there on Linux):
    add the group mysql
    add the user   mysql

```
mkgroup mysql
mkuser pgrp=mysql mysql
```

2. On AIX, Update permissions on installed mysql
   cd /usr/local/mysql
   chown -R mysql .
   chgrp -R mysql .

3. Create the MySQL data directory and initialize the grant tables:
   On AIX: /usr/local/mysql/scripts/mysql_install_db --user=mysql
   On Linux: /usr/bin/mysql_install_db --user=mysql

4. Edit Server config file to run in ASCI-QUOTES mode (required)
    On AIX:
   cp /usr/local/mysql/support-files/my-large.cnf /etc/my.cnf

   On Linux and AIX: edit /etc/my.cnf .

   under the # The MySQL server [mysqld]   section

   add the following line: *sql_mode=ANSI_QUOTES*

5. For large systems you may also need to increase max_connections to the database in the my.cnf file. The default is 100. These defaults can be seen with the SHOW VARIABLES statement. (see below).   To increase max_connections, add this line to the configuration file:

   On Linux and AIX: edit /etc/my.cnf .
   under the # The MySQL server [mysqld]   section

   add the following line: *max_connections=300*

   Other system variables might also need to change, this website gives all the MySQL system variables.

   http://dev.mysql.com/doc/refman/5.1/en/server-system-variables.html#sysvar_max_connections

6. On AIX:Update permissions for root to own database
   cd /usr/local/mysql
   chown -R root .
   chown -R mysql data

7. Set the ulimits to unlimited, if not already set and save in the /etc/security/limits file.

   Run the command ulimit -a and check the settings:

ulimit -a
time(seconds) unlimited
file(blocks) 2097151
data(kbytes) 131072
stack(kbytes) 32768
memory(kbytes) 32768
coredump(blocks) 2097151
nofiles(descriptors) 2000
threads(per process) unlimited

Change the ulimit setting to unlimited.

```
ulimit -m unlimited
ulimit -d unlimited
ulimit -f unlimited
ulimit -s unlimited
ulimit -t unlimited
```

```
Edit /etc/security/limits and make sure these
limits will stay unlimited though reboot or MySQL
may not come up after reboot. Once running with
MySQL, the xcatd daemon will get errors starting if
the database is not running.
```

8. Start the MySQL server (running as root must use the --user option):

> *On AIX:*
> */usr/local/mysql/bin/mysqld_safe --user=mysql &*
> *On Linux:*
> */usr/bin/mysqld_safe --user=mysql & or*
> *service mysqld start*

9. `Setup MySQL to make sure it is started`
   `automatically on reboot of the Management Node`
   `   On AIX:`
   `       In the /etc/inittab, add the following line`
   `before the line for xcatd to  make sure it is`
   `started before the restart of xcatd.`

   `mysql:2:once:`*/usr/local/mysql/bin/mysqld_safe --user=mysql &*

   > *On Linux:*

chkconfig mysqld on

10. `Change Admin password`
    `ON AIX:`
    `/usr/local/mysql/bin/mysqladmin -u root password`
    `'new-password'`
    `On Linux:`
    `/usr/bin/mysqladmin -u root password 'new-password'`

11. If command fails,
    `On AIX: check the /usr/local/mysql/data/mn20.err`
    `file.`
    `On Linux: check /var/log/mysqld.log`

12. `If you need to stop MySQL server run the following`
    `command:`

    `On AIX: /usr/local/mysql/bin/mysqladmin -u root -p`
    `shutdown`
    `On Linux: /usr/bin/mysqladmin -u root -p shutdown`
    `           or service mysqld stop`

13. Create the *xcatdb* database.
    On AIX: /usr/local/mysql/bin/mysql -u root -p
    On Linux: /usr/bin/mysql -u root -p
    Enter password:
    mysql > CREATE DATABASE xcatdb;

14. Create the xcat admin id with password xcat201 and grant permissions to hosts to access the database.
    On AIX:*/usr/local/mysql/bin/mysql -u root -p*

    On Linux: /usr/bin/mysql -u root -p

    Enter password:

mysql > CREATE USER xcatadmin IDENTIFIED BY 'xcat201';

15. Grant permissions to hosts to access the database, first add you Management Node where the database is running and then all other nodes that need access like servicenodes and possibly compute nodes. Note: wildcards can be used to designate entire networks.

mysql > GRANT ALL on xcatdb.* TO xcatadmin@mn20 IDENTIFIED BY 'xcat201';

mysql > GRANT ALL on xcatdb.* TO xcatadmin@<servicenode ip(s)> IDENTIFIED BY 'xcat201';

Substitute your own admin id name and password and management node and service node ip address or name.

Note: you want to do a GRANT ALL to every ipaddress or nodename that will need to access the database. You can use wildcards as follows:

mysql > GRANT ALL on xcatdb.* TO xcatadmin@'%.example.com' IDENTIFIED BY 'xcat201';

mysql > GRANT ALL on xcatdb.* TO xcatadmin@'8.113.33.%' IDENTIFIED BY 'xcat201';

16. Check the user table.
     mysql > SELECT host, user FROM mysql.user;

17. Check system variables
     mysql > SHOW VARIABLES;

18. Check the defined databases.
     mysql > SHOW DATABASES;

19. To run commands against the *xcatdb* database you can enter MySQL commands as follows:
     mysql > use xcatdb;
     mysql > SHOW TABLES;
     mysql > DESCRIBE <table name>;

To exit:
     mysql > quit;

1.3 Migrate xCAT data to MySQL

1. Back up your xCAT data. (This is required even if you have not added anything to your xCAT database yet. Required default entries were created when the xCAT RPMs were installed on the management node and they must be migrated to the new MySQL database.)

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

2. Creating the /etc/xcat/cfgloc tells the xcatd daemon what database to use. If the file does not exist, it uses by default SQLlite which is what it sets up during install. My MySQL it should contain the following line, substituting your specific info.
   The information is from the setup you put in MySQL in Configure MySQL. The dbname is the database you created, the host must match one of the host entries that you gave database access when you did the step to Grant permissions to hosts to access the database command above. You can find valid names by Check the user table. The admin and password must match user ids you put in the step: Create the xcat admin id.

   mysql:dbname=xcatdb;host=mn20|xcatadmin|xcat201

   Note: may need to use long hostname or ip address
   mysql:dbname=xcatdb;host=mn20.cluster.net|xcatadmin|xcat201
   Check the user table.

   ```
   chmod 0600 /etc/xcat/cfgloc – this protects the password
   ```

3. Restore your database to MySQL (bypass mode runs the command without xcatd):

   XCATBYPASS=1 restorexCATdb -p ~/xcat-dbback

   Note: if you get any SQL error, check to make sure you updated the my.cnf file as indicated in step:Edit Server config file to run in ASCI-QUOTES mode (required). If this needs to be done, restart MySQL server after editing my.cnf, and run the restore command again.

4. If you get errors restoring the database still, you can go back to using the SQLlite database, simply by moving the /etc/xcat/cfgloc file in /etc/xcat/cfgloc.mysql. With no cfgloc file in /etc/xcat the daemon will start using SQLlite, until problem determination can be done on MySQL.

5. Unset XCATBYPASS

6. With the restore successful, start the xcatd daemon using the MySQL database
   On AIX: *xcatstart*
   On Linux: *service xcatd restart*

1.4 Hierarchy

If running xCAT with Service Nodes, hierarchical mode, you will also using MySQL on the Service Nodes.

For AIX, read the xCAT2onAIXServiceNodes document.
For Linux, read the xCAT2 Advanced Cookbook, section on Postgresql and just substitute MySQL as your database.

1.5 Add ODBC support

Note: You only need to follow the steps in this section on adding ODBC support, if you plan to develop C,   C++ database applications on the database or run such applications (like LoadLeveler). Otherwise skip to the next section.

1. Install ODBC package and MySQL connector.
    On AIX:
        You'll need unixODBC and mysql-connector-odbc packages. unixODBC package is included in the dep-aix-xxxx.tar.gz file and mysql-connector-odbc package is included in xcat-mysql-xxxx.tar.gz. Both .gz files were downloaded when setting up the xCAT management node.

    To install the packages use the following commands:

        rpm -i unixODBC- (this is in the xcat AIX dependency package and will be on the system if you have installed the latest deps package).*
        *rpm -i mysql-connector-odbc-**

    On Linux:
        These packages comes as part of the OS. Please make sure the following packages are installed on your management node. Please refer to chapter 2.2.18 of the xCAT Top Doc for how to get packages from the distro.
        For RedHat and Fedora:
            unixODBC-*
            mysql-connector-odbc-*
        For SLES:
            unixODBC-*
            mysql-client-*
            libmysqlclient*
            MyODBC-unixODBC-*

Please note that MyODBC-unixODBC rpm can be found in SDK CD 1 for SLES 11.

2. Configure ODBC

You need to make changes to *odbc.ini* and *odbcinst.ini* files so that ODBC works with xCAT database. **These files come with unixODBC package and are located under /etc directory. (On SLES they are located under /etc/unixODBC directory).**

First find the ODBC driver. For AIX, RH and Fedora:
rpm -ql mysql-connector-odbc
For SLES:
rpm -ql MyODBC-unixODBC

It will list the file names come for the MySQL connector. Pick the one that is called libmyodbc#.so as the driver and put it into odbcinst.ini file.

```
vi /etc/odbcinst.ini   or vi /etc/unixODBC/odbcinst.ini ( SLES)
[MySQL]
Description = ODBC for MySQL
Driver      = /usr/lib64/libmyodbc3.so
```

Next, configure the DSN for ODBC, note the SERVER and DATABASE should match what was put in Creating the /etc/xcat/cfgloc file.
```
vi /etc/odbc.ini or vi /etc/unixODBC/odbc.ini (SLES)
[xCATDB]
Driver   = MySQL
SERVER   = mn20
PORT     = 3306
DATABASE = xcatdb
```

Then, put the admin user id 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 SERVER,DATABASE,USER,PASSWORD should match what was put in Creating the /etc/xcat/cfgloc file.

```
vi $roothome/.odbc.ini
[xCATDB]
SERVER = mn20
DATABASE = xcatdb
USER     = xcatadmin
PASSWORD = xcat20l

chmod 0600 .odbc.ini
```

3. Configure the Service Node
[Skip this step if there are no service nodes in the cluster.]

If there are service nodes in the cluster you need to install unixODBC and MySQL connector on them and modify the ODBC configuration files just as we did in step 1 and 2. xCAT has utilities to install additional software on the nodes. To install ODBC and MySQL on to the service nodes, refer to the following documents for details:

Linux: xCAT2-updatenode.pdf
AIX: xCAT2onAIXUpdates.pdf

Then sync the odbcinst.ini and odbc.ini files to the service nodes:
For 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

For RH and Ferdora:
   xdcp service -v /etc/odbcinst.ini /etc/odbcinst.ini
   xdcp service -v /etc/odbc.ini   /etc/odbc.ini
   xdcp service -v $roothome/.odbc.ini $roothome/.odbc.ini

For 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 $roothome/.odbc.ini $roothome/.odbc.ini

where service is the node group name for all the service nodes.

4. Test ODBC
      Please note that the path for isql command on AIX is /usr/local/bin.
 As user root:
   isql -v xCATDB
 As a non-root user:
   isql -v xCATDB xcatadmin xcat201

Then
   mysql > SHOW TABLES;

To exit:
   mysql > quit;

1.6 Removing MySQL database

To remove the database, first backup you copy:

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

Now remove the database:

> On AIX:*/usr/local/mysql/bin/mysql -u root -p*
> **On Linux***: /usr/bin/mysql -u root -p*

> Enter password:

To drop the database, enter:

>   mysql> drop database xcatdb;

1.7 Migrate to new level MySQL

If you want to migrate to a new xCAT level of MySQL, note the entire setup will have to be redone.   It is best to stay on your current level, even though a new one has been made available.   In the future,   we will be changing the install of MySQL to be more automated so this will not be the case.

If you need to update to the new xCAT MySQL, then do the following:

1) Backup your database as you did in Migrate xCAT data to MySQL.

2) Stop the MySQL server as you did in stop MySQL server.

3) Stop xcatd daemon

```
On AIX:     xcatstop
On Linux:   service xcatd stop
```
4) Unlink the previous version of MySQL

```
cd /usr/local
rm mysql
```
5) Download the latest MySQL as indicated in Install MySQL.

6) Follow the entire install process outlined in Install MySQL and Configure MySQL. You will not have to create the mysql id or group on AIX, since they already exist.   You will not have to update the /etc/my.cnf file, since it was previously setup.

7) Restore your database and start xcatd as you did in Migrate xCAT data to MySQL.

8) You will now be running on the new database level.   You can remove the old level by going to /usr/local and removing the mysql-5.0.67-aix5.3-powerpc-64bit directory. It takes up a lot of space under /usr/local.   Be sure your new level is running and your database is restored, because the old directory does contain the mysql data.

1.8 References

- *http://www.pantz.org/software/mysql/mysqlcommands.html*
- *http://dev.mysql.com/doc/refman/5.0/en/tutorial.html*