XCAT 2.x MySQL Setup

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1.0 Switch to MySQL on the Management Node

MySQL is supported on xCAT 2.1 or later. One example for using MySQL with xCAT is for Service Nodes that require a database with remote access capabilities. Other functions or programs within your environment may also benefit from or require MySQL. This document contains steps to install MySQL, configure the server, creating a database and populating it with your xCAT data.

Before using this document, you should have a general understanding of MySQL. If not review the installation and tutorial sections of the MySQL 5.1 Reference Manual located at:

http://dev.mysql.com/doc/refman/5.1/en/index.html

1.1 Install MySQL

Before you install verify you have enough free space. Increase if needed. On AIX, the /usr file system will be installed with MySQL which is quite large.

> On AIX: The xCAT RPM called *xcat-mysql* is provided to help simplify the installation of MySQL on an AIX system. Download the x*cat-mysql-2.*.gz.* From this website:
>
> https://sourceforge.net/projects/xcat/files/
>
> Untar it in the location of your choice. The *xcat-mysql* post processing will

automatically unwrap MySQL in the */usr/local* directory and will create a link for */usr/local/mysql*. It will also update the PATH environment variable in the */etc/profile* file.

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

On Linux: MySQL comes as part of the OS. Ensure 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

This section takes you through setting up the the MySQL environment, starting the server and connecting to the interactive program to create server definitions and perform queries.

This example assumes:

- Management Node: *mn20*
- Database user: *mysql*
- xCAT database name: *xcatdb*
- Database user id used by xCAT for access: *xcatadmin*
- Database password for xcatadmin: *xcat201*

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

1. Create a user id and group that will run the MySQL server.

    On AIX, add a login user and group that will be used to run mysql:

    mkgroup mysql
    mkuser pgrp=mysql mysql

Additionallyon AIX, update the mysql file permissions:

cd /usr/local/mysql
chown -R mysql .
chgrp -R mysql .

On Linux: The mysql user id already exists, and the permissions are already correct.

2. Using the mysql userid, execute the script that will 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*

3. Edit server configuration file so that it runs in *ASCI-QUOTES* mode.

   On AIX: *cp /usr/local/mysql/support-files/my-large.cnf /etc/my.cnf*

   Then on both AIX and Linux under the section:
   # The MySQL server
   [mysqld]

   add the following line:

   sql_mode=ANSI_QUOTES

4. For large systems you may also need to increase *max_connections* to the database in the *my.cnf* file. The default is 100. Add this line to the configuration file after " *sql_mode=ANSI_QUOTES*".

   max_connections=300

   For additional system variables that might also need to changed go to:

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

5. On AIX, update the data directory ownership permission to mysql.

   cd /usr/local/mysql
   chown -R root .

chown -R mysql data

6. Check ulimit 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

   If not unlimited, set the ulimits for the root id (or default) to unlimited in the /etc/security/limits file, these limits will need to stay unlimited through reboot or the start of the MySQL server may fail.

   root:

   > *fsize = -1*
   > *core = -1*
   > *cpu = -1*
   > *data = -1*
   > *rss = -1*
   > *stack = -1*
   > *stack_hard = -1*
   > *nofiles = -1*

7. 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

8. Setup MySQL to automatically start after a reboot of the Management Node.

   On AIX, add the following line before the xcatd line (so that it starts before it) in the /etc/inittab:
   mysql:2:once:/usr/local/mysql/bin/mysqld_safe --user=mysql &
   On Linux: *chkconfig mysqld on*

9. Change the root password.

   On AIX: /usr/local/mysql/bin/mysqladmin -u root password 'new-password'
   On Linux: /usr/bin/mysqladmin -u root password 'new-password'

   If command fails,

   On AIX, check the /usr/local/mysql/data/mn20.err file.
   On Linux, check /var/log/mysqld.log.

10. 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

11. Log into the MySQL interactive program.

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

12. Create the *xcatdb* database which will be populated with xCAT data later in
    this document.

    mysql > *CREATE DATABASE xcatdb;*

13. Create the xcatadmin id and password

    mysql > *CREATE USER xcatadmin IDENTIFIED BY 'xcat201';*

14. Create the lists of hosts that will have permission to access the database.
    First add your Management Node (MN), where the database is running. A
    good name to use for your MN is the name in the master attribute of the site
    table.   The name can be a long or short hostname or both. All names must
    be resolvable hostnames.
    Next add all other nodes that need access to the database.   Service Nodes are
    required for xCAT hierarchical support. Compute nodes may also need
    access depending on the application running.

mysql > *GRANT ALL on xcatdb.* TO xcatadmin@mn20 IDENTIFIED BY 'xcat201';*
mysql > *GRANT ALL on xcatdb.* TO xcatadmin@mn20.cluster.net IDENTIFIED BY 'xcat201';*
mysql > *GRANT ALL on xcatdb.* TO xcatadmin@<servicenode(s)> IDENTIFIED BY 'xcat201';*

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

15. Verify the user table was populated.

    mysql > *SELECT host, user FROM mysql.user;*
    ```
    +--------------------------+----------+
    | host                     | user     |
    +--------------------------+----------+
    | %                        | xcatadmin |
    | 127.0.0.1                | root     |
    | 8%cluster.net            | xcatadmin |
    | 8.113.33%                | xcatadmin |
    | mn20.cluster.net         | xcatadmin |
    | mn20                     | xcatadmin |
    | localhost                |          |
    | localhost                | root     |
    +--------------------------+----------+
    ```

16. Check system variables.

    mysql > *SHOW VARIABLES;*

17. Check the defined databases.

    mysql > *SHOW DATABASES;*
    ```
    +--------------------+
    | Database           |
    +--------------------+
    | information_schema |
    | mysql              |
    | test               |
    | xcatdb             |
    +--------------------+
    ```

18. The following shows you how to view the tables. At this point no tables have been defined in the xcatdb yet. Run again after the database is populated.

mysql > *use xcatdb;*
mysql > *SHOW TABLES;*
mysql > *DESCRIBE <table name>;*

19. Exit out of MySQL.

mysql > *quit;*

1.3 Migrate xCAT data to MySQL

1. You must backup your xCAT data before populating the xcatdb database.
   There are required default entries that 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 file tells xcat what database to use. If the file
   does not exits, it uses by default SQLite, which is what is setup during install
   by default. The information you put in the files, corresponds to the
   information you setup in Configure MySQL. Create a file called
   /etc/xcat/cfgloc and populate it with the following line. The dbname is the
   database you created in Create the xcatdb database .   The host must match
   one of the Management Node entries that was added in Create the lists of
   hosts that will have permission to access the database. The xcatadmin and
   password must match what was added in the step Create the xcatadmin id and
   password.
   Finally change permissions so only root can read to protect the password.

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

   chmod 0600 /etc/xcat/cfgloc

3. Restore your database to MySQL. Use bypass mode to run he command
   without xcatd. This is needed to make sure the data is restored to the
   MySQL database and not to SQlite.

   XCATBYPASS=1 restorexCATdb -p ~/xcat-dbback

   *Note: if you get errors, check to make sure you updated the my.cnf files as
   indicated in Edit server configuration file so that it runs in ASCI-QUOTES*

mode.   If you still have errors, you can go back to using SQlite, by moving /etc/xcat/cfgloc to /etc/xcat/cfgloc.save and restarting xcatd.

4. Start the xcatd daemon using the MySQL database.

   On AIX: *xcatstart*
   On Linux: *service xcatd restart*

5. Remove the bypass mode, if set.

   unset XCATBYPASS

1.4 Hierarchy

If running xCAT with Service Nodes, hierarchical mode, you will also have to install 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 need the *unixODBC* and *mysql-connector-odbc* packages included in the *dep-aix-xxxx.tar.gz* file. The *mysql-connector-odbc* package is included in *xcat-mysql-xxxx.tar.gz*. Both *.gz* files were downloaded when was set up the xCAT Management Node. To install the packages use the following commands:

   rpm -i unixODBC-*
   rpm -i mysql-connector-odbc-*

   On Linux: These packages come 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:

rpm -i unixODBC-*
rpm -i mysql-connector-odbc-*

For SLES:

rpm -i unixODBC-*
rpm -i mysql-client-*
rpm -i libmysqlclient*
rpm -i MyODBC-unixODBC- (*Please note that MyODBC-unixODBC rpm can be found in SDK CD 1 for SLES 11)

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 *libmyodbc#.so* name.

On AIX, RH and Fedora:

rpm -ql mysql-connector-odbc

vi /etc/odbcinst.ini
```
[MySQL]
Description = ODBC for MySQL
Driver     = /usr/lib/libmyodbc3.so
```

On SLES:
rpm -ql MyODBC-unixODBC

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

Then update the *obdc.ini* files with the DSN information for ODBC.

On AIX, RH and Fedora:
vi /etc/odbc.ini
```
[xCATDB]
Driver   = MySQL
SERVER   = mn20
PORT     = 3306
DATABASE = xcatdb
```

On SLES:
vi /etc/unixODBC/odbc.ini
```
[xCATDB]
Driver   = MySQL
SERVER   = mn20
PORT     = 3306
DATABASE = xcatdb
```

3. 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 id and password can be
   found in
   /etc/xcat/cfgloc file. Update the permissions also.

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

   chmod 0600 .odbc.ini

4. 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:

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

   Then sync the *odbcinst.ini* and *odbc.ini* files to the service nodes. The
   service 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 $roothome/.odbc.ini $roothome/.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 $roothome/.odbc.ini $roothome/.odbc.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 xcatadmin xcat201*
   On Linux, as root: */usr/bin/isql -v xcatdb*
   or as non-root user: */usr/bin/isql -v xcatdb xcatadmin xcat201*

4. List the tables and then exit.

   mysql > *SHOW TABLES;*
   mysql > *quit;*

1.6 Removing MySQL database

1. To remove the database, first do a backup.

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

2. Now remove the database. When the database is removed there is no undo.
   Be sure your backup is good.

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

3. Remove the database.

   mysql> *drop database xcatdb;*

1.7 Migrate to new level MySQL

When migrating to a new xCAT level of MySQL go through the entire setup again.
This 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. To summarize do the following:

1. Backup your database. Refer to section *1.3 Migrate xCAT data to MySQL.*

2. Stop the MySQL. Refer to section *1.2 Configure MySQL.*

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 section *1.1 Install MySQL.*

6. Follow the entire install process outlined in sections *1.1 Install MySQL* and *1.2 Configure MySQL.* You do not need to create the mysql id or group on AIX, since they already exist. You will need to create the /etc/my.cnf file.

7. Restore your database and start xcatd as you did in section *1.3 Migrate xCAT data to MySQL.*

8. You are now 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. 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*