

MySQL Connector/MXJ

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Abstract

This manual describes MySQL Connector/MXJ.

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MySQL Connector/MXJ

MySQL Connector/MXJ is a Java Utility package for deploying and managing a MySQL database. Deploying and using MySQL can be as easy as adding an additional parameter to the JDBC connection url, which will result in the database being started when the first connection is made. This makes it easy for Java developers to deploy applications which require a database by reducing installation barriers for their end-users.

MySQL Connector/MXJ makes the MySQL database appear to be a java-based component. It does this by determining what platform the system is running on, selecting the appropriate binary, and launching the executable. It will also optionally deploy an initial database, with any specified parameters.

Included are instructions for use with a JDBC driver and deploying as a JMX MBean to JBoss.

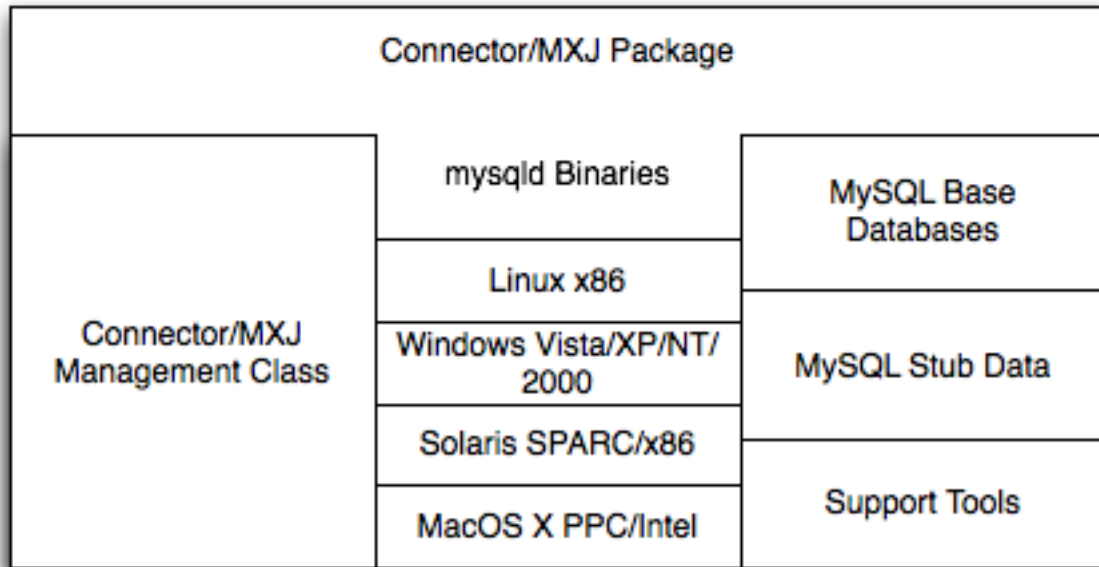
You can download sources and binaries from: <http://dev.mysql.com/downloads/connector/mxj/>

This a beta release and feedback is welcome and encouraged.

Please send questions or comments to the [MySQL and Java mailing list](#).

Chapter 1. Connector/MXJ Overview

Connector/MXJ consists of a Java class, a copy of the `mysqld` binary for a specific list of platforms, and associated files and support utilities. The Java class controls the initialization of an instance of the embedded `mysqld` binary, and the ongoing management of the `mysqld` process. The entire sequence and management can be controlled entirely from within Java using the Connector/MXJ Java classes. You can see an overview of the contents of the Connector/MXJ package in the figure below.



It is important to note that Connector/MXJ is not an embedded version of MySQL, or a version of MySQL written as part of a Java class. Connector/MXJ works through the use of an embedded, compiled binary of `mysqld` as would normally be used when deploying a standard MySQL installation.

It is the Connector/MXJ wrapper, support classes and tools, that enable Connector/MXJ to appear as a MySQL instance.

When Connector/MXJ is initialized, the corresponding `mysqld` binary for the current platform is extracted, along with a pre-configured data directory. Both are contained within the Connector/MXJ JAR file. The `mysqld` instance is then started, with any additional options as specified during the initialization, and the MySQL database becomes accessible.

Because Connector/MXJ works in combination with Connector/J, you can access and integrate with the MySQL instance through a JDBC connection. When you have finished with the server, the instance is terminated, and, by default, any data created during the session is retained within the temporary directory created when the instance was started.

Connector/MXJ and the embedded `mysqld` instance can be deployed in a number of environments where relying on an existing database, or installing a MySQL instance would be impossible, including CD-ROM embedded database applications and temporary database requirements within a Java-based application environment.

Chapter 2. Connector/MXJ Versions

- Connector/MXJ 5.x, currently in beta status, includes `mysqld` version 5.x and includes binaries for Linux x86, Mac OS X PPC, Windows XP/NT/2000 x86 and Solaris SPARC. Connector/MXJ 5.x requires the Connector/J 5.x package.

The exact version of `mysqld` included depends on the version of Connector/MXJ

1. Connector/MXJ v5.0.3 included MySQL v5.0.22
 2. Connector/MXJ v5.0.4 includes MySQL v5.0.27 (Community) or MySQL v5.0.32 (Enterprise)
 3. Connector/MXJ v5.0.6 includes MySQL 5.0.37 (Community)
 4. Connector/MXJ v5.0.7 includes MySQL 5.0.41 (Community) or MySQL 5.0.42 (Enterprise)
 5. Connector/MXJ v5.0.8 includes MySQL 5.0.45 (Community) or MySQL 5.0.46 (Enterprise)
 6. Connector/MXJ v5.0.9 includes MySQL 5.0.51a (Community) or MySQL 5.0.54 (Enterprise)
- Connector/MXJ 1.x includes `mysqld` version 4.1.13 and includes binaries for Linux x86, Windows XP/NT/2000 x86 and Solaris SPARC. Connector/MXJ 1.x requires the Connector/J 3.x package.

A summary of the different MySQL versions supplied with each Connector/MXJ release are shown in the table.

Connector/MXJ Version	MySQL Version(s)
5.0.8	5.0.45 (CS), 5.0.46 (ES)
5.0.7	5.0.41 (CS), 5.0.42 (ES)
5.0.6	5.0.37 (CS), 5.0.40 (ES)
5.0.5	5.0.37 (CS), 5.0.36 (ES)
5.0.4	5.0.27 (CS), 5.0.32 (ES)
5.0.3	5.0.22
5.0.2	5.0.19

This guide provides information on the Connector/MXJ 5.x release. For information on using the older releases, please see the documentation included with the appropriate distribution.

Chapter 3. Connector/MXJ Installation

Connector/MXJ does not have an installation application or process, but there are some steps you can follow to make the installation and deployment of Connector/MXJ easier.

Before you start, there are some baseline requirements for

- Java Runtime Environment (v1.4.0 or newer) if you are only going to deploy the package.
- Java Development Kit (v1.4.0 or newer) if you want to build Connector/MXJ from source.
- Connector/J 5.0 or newer.

Depending on your target installation/deployment environment you may also require:

- JBoss - 4.0rc1 or newer
- Apache Tomcat - 5.0 or newer
- Sun's JMX reference implementation version 1.2.1 (from <http://java.sun.com/products/JavaManagement/>)

3.1. Supported Platforms

Connector/MXJ is compatible with any platform supporting Java and MySQL. By default, Connector/MXJ incorporates the `mysqld` binary for a select number of platforms which differs by version. The following platforms have been tested and working as deployment platforms. Support for all the platforms listed below is not included by default.

- Linux (i386)
- FreeBSD (i386)
- Windows NT (x86), Windows 2000 (x86), Windows XP (x86), Windows Vista (x86)
- Solaris 8, SPARC 32-bit (compatible with Solaris 8, Solaris 9 and Solaris 10 on SPARC 32-bit and 64-bit platforms)
- Mac OS X (PowerPC and Intel)

The Connector/MXJ 5.0.8 release includes `mysqld` binaries for the following platforms by as standard:

- Linux (i386)
- Windows (x86), compatible with Windows NT, Windows 2000, Windows XP, Windows Vista
- Solaris 8, SPARC 32-bit (compatible with Solaris 8, Solaris 9 and Solaris 10 on SPARC 32-bit and 64-bit platforms)
- Mac OS X (PowerPC and Intel)

For more information on packaging your own Connector/MXJ with the platforms you require, see [Section 5.1, "Creating your own Connector/MXJ Package"](#)

3.2. Connector/MXJ Base Installation

Because there is no formal installation process, the method, installation directory, and access methods you use for Connector/MXJ are entirely up to your individual requirements.

To perform a basic installation, choose a target directory for the files included in the Connector/MXJ package. On Unix/Linux systems

you may opt to use a directory such as `/usr/local/connector-mxj`; On Windows, you may want to install the files in the base directory, `C:\Connector-MXJ`, or within the [Program Files](#) directory.

To install the files, for a Connector/MXJ 5.0.4 installation:

1. Download the Connector/MXJ package, either in Tar/Gzip format (ideal for Unix/Linux systems) or Zip format (Windows).
2. Extract the files from the package. This will create a directory `mysql-connector-mxj-gpl-[ver]`. Copy and optionally rename this directory to your desired location.
3. For best results, you should update your global `CLASSPATH` variable with the location of the required `jar` files.

Within Unix/Linux you can do this globally by editing the global shell profile, or on a user by user basis by editing their individual shell profile.

On Windows 2000, Windows NT and Windows XP, you can edit the global `CLASSPATH` by editing the [Environment Variables](#) configured through the [System](#) control panel.

For Connector/MXJ 5.0.6 and later you need the following JAR files in your `CLASSPATH`:

1. `mysql-connector-mxj-gpl-[ver].jar` — contains the main Connector/MXJ classes.
2. `mysql-connector-mxj-gpl-[ver]-db-files.jar` — contains the embedded `mysqld` and database files.
3. `aspectjrt.jar` — the AspectJ runtime library, located in `lib/aspectjrt.jar` in the Connector/MXJ package.
4. `mysql-connector-java-[ver]-bin.jar` — Connector/J, see [MySQL Connector/J](#).

For Connector/MXJ 5.0.4 and later you need the following JAR files in your `CLASSPATH`:

1. `connector-mxj.jar` — contains the main Connector/MXJ classes.
2. `connector-mxj-db-files.jar` — contains the embedded `mysqld` and database files.
3. `aspectjrt.jar` — the AspectJ runtime library, located in `lib/aspectjrt.jar` in the Connector/MXJ package.
4. `mysql-connector-mxj-gpl-[ver].jar` — Connector/J, see [MySQL Connector/J](#).

For Connector/MXJ 5.0.3 and earlier, you need the following JAR files:

1. `connector-mxj.jar`
2. `aspectjrt.jar` — the AspectJ runtime library, located in `lib/aspectjrt.jar` in the Connector/MXJ package.
3. `mysql-connector-mxj-gpl-[ver].jar` — Connector/J, see [MySQL Connector/J](#).

3.3. Connector/MXJ Quick Start Guide

Once you have extracted the Connector/MXJ and Connector/J components you can run one of the sample applications that initiates a MySQL instance. You can test the installation by running the [ConnectorMXJUrlTestExample](#):

```
shell> java ConnectorMXJUrlTestExample
jdbc:mysql:mxj://localhost:3336/our_test_app?server_basedir=
=/var/tmp/test-mxj&createDatabaseIfNotExist=true&server.initialize-user=true
[/var/tmp/test-mxj/bin/mysqld][--no-defaults][--port=3336][--socket=mysql.sock]>
[--basedir=/var/tmp/test-mxj][--datadir=/var/tmp/test-mxj/data]>
[--pid-file=/var/tmp/test-mxj/data/MysqldResource.pid]
[MysqldResource] launching mysqld (driver_launched_mysqld_1)
InnoDB: The first specified data file ./ibdata1 did not exist:
InnoDB: a new database to be created!
080220 9:40:20 InnoDB: Setting file ./ibdata1 size to 10 MB
```

```

InnoDB: Database physically writes the file full: wait...
080220 9:40:20 InnoDB: Log file ./ib_logfile0 did not exist: new to be created
InnoDB: Setting log file ./ib_logfile0 size to 5 MB
InnoDB: Database physically writes the file full: wait...
080220 9:40:20 InnoDB: Log file ./ib_logfile1 did not exist: new to be created
InnoDB: Setting log file ./ib_logfile1 size to 5 MB
InnoDB: Database physically writes the file full: wait...
InnoDB: Doublewrite buffer not found: creating new
InnoDB: Doublewrite buffer created
InnoDB: Creating foreign key constraint system tables
InnoDB: Foreign key constraint system tables created
080220 9:40:21 InnoDB: Started; log sequence number 0 0
080220 9:40:21 [Note] /var/tmp/test-mxj/bin/mysqld: ready for connections.
Version: '5.0.51a' socket: 'mysql.sock' port: 3336 MySQL Community Server (GPL)
[MysqldResource] mysqld running as process: 2238
-----
SELECT VERSION()
-----
5.0.51a
-----
[MysqldResource] stopping mysqld (process: 2238)
080220 9:40:27 [Note] /var/tmp/test-mxj/bin/mysqld: Normal shutdown
080220 9:40:27 InnoDB: Starting shutdown...
080220 9:40:29 InnoDB: Shutdown completed; log sequence number 0 43655
080220 9:40:29 [Note] /var/tmp/test-mxj/bin/mysqld: Shutdown complete
[MysqldResource] shutdown complete

```

The above output shows an instance of MySQL starting, the necessary files being created (log files, InnoDB data files) and the MySQL database entering the running state. The instance is then shutdown by Connector/MXJ before the example terminates.

Warning

You should avoid running your Connector/MXJ application as the `root` user, because this will cause the `mysqld` to also be executed with root privileges. For more information, see [How to Run MySQL as a Normal User](#).

3.4. Deploying Connector/MXJ using Driver Launch

Connector/MXJ and Connector/J work together to enable you to launch an instance of the `mysqld` server through the use of a keyword in the JDBC connection string. Deploying Connector/MXJ within a Java application can be automated through this method, making the deployment of Connector/MXJ a simple process:

1. Download and unzip Connector/MXJ, add `mysql-connector-mxj-gpl-[ver].jar` to the `CLASSPATH`.
If you are using Connector/MXJ v5.0.4 or later you will also need to add the `mysql-connector-mxj-gpl-[ver]-db-files.jar` file to your `CLASSPATH`.
2. To the JDBC connection string, embed the `mxj` keyword, for example: `jdbc:mysql:mxj://localhost:PORT/DBNAME`.

For more details, see [Chapter 4, Connector/MXJ Configuration](#).

3.5. Deploying Connector/MXJ within JBoss

For deployment within a JBoss environment, you must configure the JBoss environment to use the Connector/MXJ component within the JDBC parameters:

1. Download Connector/MXJ and copy the `mysql-connector-mxj-gpl-[ver].jar` file to the `$JBOSS_HOME/server/default/lib` directory.
If you are using Connector/MXJ v5.0.4 or later you will also need to copy the `mysql-connector-mxj-gpl-[ver]-db-files.jar` file to `$JBOSS_HOME/server/default/lib`.
2. Download Connector/J and copy the `mysql-connector-java-5.1.5-bin.jar` file to the `$JBOSS_HOME/server/default/lib` directory.
3. Create an MBean service xml file in the `$JBOSS_HOME/server/default/deploy` directory with any attributes set, for instance the `datadir` and `autostart`.
4. Set the JDBC parameters of your web application to use:

```
String driver = "com.mysql.jdbc.Driver";
String url = "jdbc:mysql:///test?propertiesTransform="+
    "com.mysql.management.jmx.ConnectorMXJPropertiesTransform";
String user = "root";
String password = "";
Class.forName(driver);
Connection conn = DriverManager.getConnection(url, user, password);
```

You may wish to create a separate users and database table spaces for each application, rather than using "root and test".

We highly suggest having a routine backup procedure for backing up the database files in the `datadir`.

3.6. Verifying Installation using JUnit

The best way to ensure that your platform is supported is to run the JUnit tests. These will test the Connector/MXJ classes and the associated components.

3.6.1. JUnit Test Requirements

The first thing to do is make sure that the components will work on the platform. The `MysqldResource` class is really a wrapper for a native version of MySQL, so not all platforms are supported. At the time of this writing, Linux on the i386 architecture has been tested and seems to work quite well, as does OS X v10.3. There has been limited testing on Windows and Solaris.

Requirements:

1. JDK-1.4 or newer (or the JRE if you aren't going to be compiling the source or JSPs).
2. MySQL Connector/J version 5.0 or newer (from <http://dev.mysql.com/downloads/connector/j/>) installed and available via your CLASSPATH.
3. The `javax.management` classes for JMX version 1.2.1, these are present in the following application servers:
 - JBoss - 4.0rc1 or newer.
 - Apache Tomcat - 5.0 or newer.
 - Sun's JMX reference implementation version 1.2.1 (from <http://java.sun.com/products/JavaManagement/>).
4. JUnit 3.8.1 (from <http://www.junit.org/>).

If building from source, All of the requirements from above, plus:

1. Ant version 1.5 or newer (download from <http://ant.apache.org/>).

3.6.2. Running the JUnit Tests

1. The tests attempt to launch MySQL on the port 3336. If you have a MySQL running, it may conflict, but this isn't very likely because the default port for MySQL is 3306. However, You may set the "c-mxj_test_port" Java property to a port of your choosing. Alternatively, you may wish to start by shutting down any instances of MySQL you have running on the target machine.

The tests suppress output to the console by default. For verbose output, you may set the "c-mxj_test_silent" Java property to "false".

2. To run the JUnit test suite, the \$CLASSPATH must include the following:
 - JUnit
 - JMX

- Connector/J
- MySQL Connector/MXJ

3. If `connector-mxj.jar` is not present in your download, unzip MySQL Connector/MXJ source archive.

```
cd mysqljmx
ant dist
```

Then add `$TEMP/cmxj/stage/connector-mxj/connector-mxj.jar` to the CLASSPATH.

4. If you have `junit`, execute the unit tests. From the command line, type:

```
java com.mysql.management.AllTestsSuite
```

The output should look something like this:

```
.....
Time: 259.438
OK (101 tests)
```

Note that the tests are a bit slow near the end, so please be patient.

Chapter 4. Connector/MXJ Configuration

4.1. Running as part of the JDBC Driver

A feature of the MySQL Connector/J JDBC driver is the ability to specify a connection to an embedded Connector/MXJ instance through the use of the `mxj` keyword in the JDBC connection string.

In the following example, we have a program which creates a connection, executes a query, and prints the result to the `System.out`. The MySQL database will be deployed and started as part of the connection process, and shutdown as part of the finally block.

You can find this file in the Connector/MXJ package as `src/ConnectorMXJUrlTestExample.java`.

```
import java.io.File;
import java.sql.Connection;
import java.sql.DriverManager;
import com.mysql.management.driverlaunched.ServerLauncherSocketFactory;
import com.mysql.management.util.QueryUtil;
public class ConnectorMXJUrlTestExample {
    public static String DRIVER = "com.mysql.jdbc.Driver";
    public static String JAVA_IO_TMPDIR = "java.io.tmpdir";
    public static void main(String[] args) throws Exception {
        File ourAppDir = new File(System.getProperty(JAVA_IO_TMPDIR));
        File databaseDir = new File(ourAppDir, "test-mxj");
        int port = Integer.parseInt(System.getProperty("c-mxj_test_port", "3336"));
        String dbName = "our_test_app";
        String url = "jdbc:mysql:mxj://localhost:" + port + "/" + dbName //
            + "?" + "server.basedir=" + databaseDir //
            + "&" + "createDatabaseIfNotExist=true" //
            + "&" + "server.initialize-user=true" //
        ;
        System.out.println(url);
        String userName = "alice";
        String password = "q93uti0opwhkd";
        Class.forName(DRIVER);
        Connection conn = null;
        try {
            conn = DriverManager.getConnection(url, userName, password);
            String sql = "SELECT VERSION()";
            String queryForString = new QueryUtil(conn).queryForString(sql);
            System.out.println("-----");
            System.out.println(sql);
            System.out.println("-----");
            System.out.println(queryForString);
            System.out.println("-----");
            System.out.flush();
            Thread.sleep(100); // wait for System.out to finish flush
        } finally {
            try {
                if (conn != null)
                    conn.close();
            } catch (Exception e) {
                e.printStackTrace();
            }
            ServerLauncherSocketFactory.shutdown(databaseDir, null);
        }
    }
}
```

To run the above program, be sure to have `connector-mxj.jar` and `Connector/J` in the `CLASSPATH`. Then type:

```
java ConnectorMXJTestExample
```

4.2. Running within a Java Object

If you have a java application and wish to “embed” a MySQL database, make use of the `com.mysql.management.MysqldResource` class directly. This class may be instantiated with the default (no argument) constructor, or by passing in a `java.io.File` object representing the directory you wish the server to be “unzipped” into. It may also be instantiated with printstreams for “stdout” and “stderr” for logging.

Once instantiated, a `java.util.Map`, the object will be able to provide a `java.util.Map` of server options appropriate for the platform and version of MySQL which you will be using.

The `MysqldResource` enables you to “start” MySQL with a `java.util.Map` of server options which you provide, as well as

"shutdown" the database. The following example shows a simplistic way to embed MySQL in an application using plain java objects.

You can find this file in the Connector/MXJ package as [src/ConnectorMXJObjectTestExample.java](#).

```
import java.io.File;
import java.sql.Connection;
import java.sql.DriverManager;
import java.util.HashMap;
import java.util.Map;
import com.mysql.management.MysqldResource;
import com.mysql.management.MysqldResourceI;
import com.mysql.management.util.QueryUtil;
public class ConnectorMXJObjectTestExample {
    public static final String DRIVER = "com.mysql.jdbc.Driver";
    public static final String JAVA_IO_TMPDIR = "java.io.tmpdir";
    public static void main(String[] args) throws Exception {
        File ourAppDir = new File(System.getProperty(JAVA_IO_TMPDIR));
        File databaseDir = new File(ourAppDir, "mysql-mxj");
        int port = Integer.parseInt(System.getProperty("c-mxj_test_port",
            "3336"));
        String userName = "alice";
        String password = "q93uti0opwhkd";
        MysqldResource mysqldResource = startDatabase(databaseDir, port,
            userName, password);
        Class.forName(DRIVER);
        Connection conn = null;
        try {
            String dbName = "our_test_app";
            String url = "jdbc:mysql://localhost:" + port + "/" + dbName //
                + "?" + "createDatabaseIfNotExist=true"//
            ;
            conn = DriverManager.getConnection(url, userName, password);
            String sql = "SELECT VERSION()";
            String queryForString = new QueryUtil(conn).queryForString(sql);
            System.out.println("-----");
            System.out.println(sql);
            System.out.println("-----");
            System.out.println(queryForString);
            System.out.println("-----");
            System.out.flush();
            Thread.sleep(100); // wait for System.out to finish flush
        } finally {
            try {
                if (conn != null) {
                    conn.close();
                }
            } catch (Exception e) {
                e.printStackTrace();
            }
            try {
                mysqldResource.shutdown();
            } catch (Exception e) {
                e.printStackTrace();
            }
        }
    }
}

public static MysqldResource startDatabase(File databaseDir, int port,
    String userName, String password) {
    MysqldResource mysqldResource = new MysqldResource(databaseDir);
    Map database_options = new HashMap();
    database_options.put(MysqldResourceI.PORT, Integer.toString(port));
    database_options.put(MysqldResourceI.INITIALIZE_USER, "true");
    database_options.put(MysqldResourceI.INITIALIZE_USER_NAME, userName);
    database_options.put(MysqldResourceI.INITIALIZE_PASSWORD, password);
    mysqldResource.start("test-mysqld-thread", database_options);
    if (!mysqldResource.isRunning()) {
        throw new RuntimeException("MySQL did not start.");
    }
    System.out.println("MySQL is running.");
    return mysqldResource;
}
```

4.3. Setting server options

Of course there are many options we may wish to set for a MySQL database. These options may be specified as part of the JDBC connection string simply by prefixing each server option with `server..` In the following example we set two driver parameters and two server parameters:

```
String url = "jdbc:mysql://" + hostColonPort + "/"
    + "?"
    + "cacheServerConfiguration=true"
    + "&"
    + "useLocalSessionState=true"
    + "&"
```

```
+ "server.basedir=/opt/myapp/db"  
+ "&"  
+ "server.datadir=/mnt/bigdisk/myapp/data";
```

Starting with Connector/MXJ 5.0.6 you can use the `initializer-user` property to a connection string. If set to true, the default anonymous and root users will be removed and the user/password combination from the connection URL will be used to create a new user. For example:

```
String url = "jdbc:mysql:mxj://localhost:" + port  
+ "/alice_db"  
+ "?server.datadir=" + dataDir.getPath()  
+ "&server.initialize-user=true"  
+ "&createDatabaseIfNotExist=true"  
;
```

Chapter 5. Connector/MXJ Notes and Tips

This section contains notes and tips on using the Connector/MXJ component within your applications.

5.1. Creating your own Connector/MXJ Package

If you want to create a custom Connector/MXJ package that includes a specific `mysqld` version or platform then you must extract and rebuild the `mysql-connector-mxj.jar` (Connector/MXJ v5.0.3 or earlier) or `mysql-connector-mxj-gpl-[ver]-db-files.jar` (Connector/MXJ v5.0.4 or later) file.

First, you should create a new directory into which you can extract the current `connector-mxj.jar`:

```
shell> mkdir custom-mxj
shell> cd custom-mxj
shell> jar -xf connector-mxj.jar
shell> ls
5-0-22/
ConnectorMXJObjectTestExample.class
ConnectorMXJUrlTestExample.class
META-INF/
TestDb.class
com/
kill.exe
```

If you are using Connector/MXJ v5.0.4 or later, you should unpack the `connector-mxj-db-files.jar`:

```
shell> mkdir custom-mxj
shell> cd custom-mxj
shell> jar -xf connector-mxj-db-files.jar
shell> ls
5-0-51a/
META-INF/
connector-mxj.properties
```

The MySQL version directory, `5-0-22` or `5-0-51a` in the preceding examples, contains all of the files used to create an instance of MySQL when Connector/MXJ is executed. All of the files in this directory are required for each version of MySQL that you want to embed. Note as well the format of the version number, which uses hyphens instead of periods to separate the version number components.

Within the version specific directory are the platform specific directories, and archives of the `data` and `share` directory required by MySQL for the various platforms. For example, here is the listing for the default Connector/MXJ package:

```
shell>> ls
Linux-i386/
META-INF/
Mac_OS_X-ppc/
SunOS-sparc/
Win-x86/
com/
data_dir.jar
share_dir.jar
win_share_dir.jar
```

Platform specific directories are listed by their OS and platform - for example the `mysqld` for Mac OS X PowerPC is located within the `Mac_OS_X-ppc` directory. You can delete directories from this location that you do not require, and add new directories for additional platforms that you want to support.

To add a platform specific `mysqld`, create a new directory with the corresponding name for your operating system/platform. For example, you could add a directory for Mac OS X/Intel using the directory `Mac_OS_X-i386`.

On Unix systems, you can determine the platform using `uname`:

```
shell> uname -p
i386
```

In Connector/MXJ v5.0.9 and later, an additional `platform-map.properties` file is used to associate a specific platform and operating system combination with the directory in which the `mysqld` for that combination is located. The determined operating system and platform are on the left, and the directory name where the appropriate `mysqld` is located is on the right. You can see a sample of the file below:

```

Linux-i386=Linux-i386
Linux-x86=Linux-i386
Linux-i686=Linux-i386
Linux-x86_64=Linux-i386
Linux-ia64=Linux-i386
#Linux-ppc=Linux-ppc
#Linux-ppc64=Linux-ppc
Mac_OS_X-i386=Mac_OS_X-i386
Mac_OS_X-ppc=Mac_OS_X-ppc
Rhapsody-PowerPC=Mac_OS_X-ppc
#Mac_OS-PowerPC=
#macOS-PowerPC=
#MacOS-PowerPC=
SunOS-sparc=SunOS-sparc
Solaris-sparc=SunOS-sparc
SunOS-x86=SunOS-x86
Solaris-x86=SunOS-x86
FreeBSD-x86=FreeBSD-x86
Windows_Vista-x86=Win-x86
Windows_2003-x86=Win-x86
Windows_XP-x86=Win-x86
Windows_2000-x86=Win-x86
Windows_NT-x86=Win-x86
Windows_NT_(unknown)-x86=Win-x86

```

Now you need to download or compile `mysqld` for the MySQL version and platform you want to include in your custom `connector-mxj.jar` package into the new directory.

Create a file called `version.txt` in the OS/platform directory you have just created that contains the version string/path of the `mysqld` binary. For example:

```
mysql-5.0.22-osx10.3-i386/bin/mysqld
```

You can now recreate the `connector-mxj.jar` file with the added `mysqld`:

```

shell> cd custom-mxj
shell> jar -cf ../connector-mxj.jar *

```

For Connector/MXJ v5.0.4 and later, you should repackage to the `connector-mxj-db-files.jar`:

```

shell> cd custom-mxj
shell> jar -cf ../mysql-connector-mxj-gpl-[ver]-db-files.jar *

```

You should test this package using the steps outlined in [Section 3.3, “Connector/MXJ Quick Start Guide”](#).

Note

Because the `mysql-connector-mxj-gpl-[ver]-db-files.jar` file is separate from the main Connector/MXJ classes you can distribute different `mysql-connector-mxj-gpl-[ver]-db-files.jar` files to different hosts or for different projects without having to create a completely new main `mysql-connector-mxj-gpl-[ver].jar` file for each one.

5.2. Deploying Connector/MXJ with a pre-configured database

To include a pre-configured/populated database within your Connector/MXJ JAR file you must create a custom `data_dir.jar` file, as included within the main `connector-mxj.jar` (Connector/MXJ 5.0.3 or earlier) or `mysql-connector-mxj-gpl-[ver]-db-files.jar` (Connector/MXJ 5.0.4 or later) file:

1. First extract the `connector-mxj.jar` or `mysql-connector-gpl-[ver]-db-files.jar` file, as outlined in the previous section (see [Section 5.1, “Creating your own Connector/MXJ Package”](#)).
2. First, create your database and populate the database with the information you require in an existing instance of MySQL - including Connector/MXJ instances. Data file formats are compatible across platforms.
3. Shutdown the instance of MySQL.
4. Create a JAR file of the data directory and databases that you want to include your Connector/MXJ package. You should include the `mysql` database, which includes user authentication information, in addition to the specific databases you want to include. For

example, to create a JAR of the `mysql` and `mxjtest` databases:

```
shell> jar -cf ../data_dir.jar mysql mxjtest
```

- For Connector/MXJ 5.0.3 or earlier, copy the `data_dir.jar` file into the extracted `connector-mxj.jar` directory, and then create an archive for `connector-mxj.jar`.

For Connector/MXJ 5.0.4 or later, copy the `data_dir.jar` file into the extracted `mysql-connect-or-mxj-gpl-[ver]-db-files.jar` directory, and then create an archive for `mysql-connect-or-mxj-db-gpl-[ver]--files.jar`.

Note that if you are create databases using the InnoDB engine, you must include the `ibdata.*` and `ib_logfile*` files within the `data_dir.jar` archive.

5.3. Running within a JMX Agent (custom)

As a JMX MBean, MySQL Connector/MXJ requires a JMX v1.2 compliant MBean container, such as JBoss version 4. The MBean will uses the standard JMX management APIs to present (and allow the setting of) parameters which are appropriate for that platform.

If you are not using the SUN Reference implementation of the JMX libraries, you should skip this section. Or, if you are deploying to JBoss, you also may wish to skip to the next section.

We want to see the `MysqldDynamicMBean` in action inside of a JMX agent. In the `com.mysql.management.jmx.sunri` package is a custom JMX agent with two MBeans:

- The `MysqldDynamicMBean`, and
- A `com.sun.jdmk.comm.HtmlAdaptorServer`, which provides a web interface for manipulating the beans inside of a JMX agent.

When this very simple agent is started, it will allow a MySQL database to be started and stopped with a web browser.

- Complete the testing of the platform as above.
 - Current JDK, JUnit, Connector/J, MySQL Connector/MXJ
 - This section *requires* the SUN reference implementation of JMX
 - `PATH`, `JAVA_HOME`, `ANT_HOME`, `CLASSPATH`
- If not building from source, skip to next step

Rebuild with the "sunri.present"

```
ant -Dsunri.present=true dist
re-run tests:
java junit.textui.TestRunner com.mysql.management.AllTestsSuite
```

- Launch the test agent from the command line:

```
java com.mysql.management.jmx.sunri.MysqldTestAgentSunHtmlAdaptor &
```

- From a browser:

```
http://localhost:9092/
```

- Under `MysqldAgent`,

```
select "name=mysqlld"
```

6. Observe the MBean View
7. Scroll to the bottom of the screen press the STARTMYSQLD button
8. Click [Back to MBean View](#)
9. Scroll to the bottom of the screen press STOPMYSQLD button
10. Kill the java process running the Test Agent (jmx server)

5.4. Deployment in a standard JMX Agent environment (JBoss)

Once there is confidence that the MBean will function on the platform, deploying the MBean inside of a standard JMX Agent is the next step. Included are instructions for deploying to JBoss.

1. Ensure a current version of java development kit (v1.4.x), see above.
 - Ensure `JAVA_HOME` is set (JBoss requires `JAVA_HOME`)
 - Ensure `JAVA_HOME/bin` is in the `PATH` (You will NOT need to set your `CLASSPATH`, nor will you need any of the jars used in the previous tests).
2. Ensure a current version of JBoss (v4.0RC1 or better)

```
http://www.jboss.org/index.html
select "Downloads"
select "jboss-4.0.zip"
pick a mirror
unzip ~/dload/jboss-4.0.zip
create a JBOSS_HOME environment variable set to the unzipped directory
unix only:
cd $JBOSS_HOME/bin
chmod +x *.sh
```

3. Deploy (copy) the `connector-mxj.jar` to `$JBOSS_HOME/server/default/lib`.
4. Deploy (copy) `mysql-connector-java-3.1.4-beta-bin.jar` to `$JBOSS_HOME/server/default/lib`.
5. Create a `mxjtest.war` directory in `$JBOSS_HOME/server/default/deploy`.
6. Deploy (copy) `index.jsp` to `$JBOSS_HOME/server/default/deploy/mxjtest.war`.
7. Create a `mysqld-service.xml` file in `$JBOSS_HOME/server/default/deploy`.

```
<?xml version="1.0" encoding="UTF-8"?>
<server>
  <mbean code="com.mysql.management.jmx.jboss.JBossMysqldDynamicMBean"
    name="mysql:type=service,name=mysqld">
    <attribute name="datadir">/tmp/xxx_data_xxx</attribute>
    <attribute name="autostart">true</attribute>
  </mbean>
</server>
```

8. Start jboss:
 - On unix: `$JBOSS_HOME/bin/run.sh`
 - On windows: `%JBOSS_HOME%\bin\run.bat`

Be ready: JBoss sends a lot of output to the screen.
9. When JBoss seems to have stopped sending output to the screen, open a web browser to: `http://localhost:8080/jmx-console`
10. Scroll down to the bottom of the page in the `mysql` section, select the bulleted `mysqld` link.

11. Observe the JMX MBean View page. MySQL should already be running.
12. (If "autostart=true" was set, you may skip this step.) Scroll to the bottom of the screen. You may press the INVOKE button to stop (or start) MySQL observe `Operation completed successfully without a return value`. Click `Back to MBean View`
13. To confirm MySQL is running, open a web browser to `http://localhost:8080/mxjtest/` and you should see that

```
SELECT 1
```

returned with a result of

```
1
```

14. Guided by the `$_JBASS_HOME/server/default/deploy/mxjtest.war/index.jsp` you will be able to use MySQL in your Web Application. There is a `test` database and a `root` user (no password) ready to experiment with. Try creating a table, inserting some rows, and doing some selects.
15. Shut down MySQL. MySQL will be stopped automatically when JBoss is stopped, or: from the browser, scroll down to the bottom of the MBean View press the stop service INVOKE button to halt the service. Observe `Operation completed successfully without a return value`. Using `ps` or `task manager` see that MySQL is no longer running

As of 1.0.6-beta version is the ability to have the MBean start the MySQL database upon start up. Also, we've taken advantage of the JBoss life-cycle extension methods so that the database will gracefully shut down when JBoss is shutdown.

Chapter 6. Connector/MXJ Support

There are a wide variety of options available for obtaining support for using Connector/MXJ. You should contact the Connector/MXJ community for help before reporting a potential bug or problem. See [Section 6.1, “Connector/MXJ Community Support”](#).

6.1. Connector/MXJ Community Support

Sun Microsystems, Inc. provides assistance to the user community by means of a number of mailing lists and web based forums.

You can find help and support through the [MySQL and Java](#) mailing list.

For information about subscribing to MySQL mailing lists or to browse list archives, visit <http://lists.mysql.com/>. See [MySQL Mailing Lists](#).

Community support from experienced users is also available through the [MyODBC Forum](#). You may also find help from other users in the other MySQL Forums, located at <http://forums.mysql.com>. See [MySQL Community Support at the MySQL Forums](#).

6.2. How to Report Connector/MXJ Problems

If you encounter difficulties or problems with Connector/MXJ, contact the Connector/MXJ community [Section 6.1, “Connector/MXJ Community Support”](#).

If reporting a problem, you should ideally include the following information with the email:

- Operating system and version
- Connector/MXJ version
- MySQL server version
- Copies of error messages or other unexpected output
- Simple reproducible sample

Remember that the more information you can supply to us, the more likely it is that we can fix the problem.

If you believe the problem to be a bug, then you must report the bug through <http://bugs.mysql.com/>.

6.3. Connector/MXJ Change History

The Connector/MXJ Change History (Changelog) is located with the main Changelog for MySQL. See [Appendix A, *MySQL Connector/MXJ Change History*](#).

Appendix A. MySQL Connector/MXJ Change History

A.1. Changes in MySQL Connector/MXJ 5.0.6 (04 May 2007)

Functionality added or changed:

- Updated internal jar file names to include version information and be more consistent with Connector/J jar naming. For example, `connector-mxj.jar` is now `mysql-connector-mxj-${mxj-version}.jar`.
- Updated commercial license files.
- Added copyright notices to some classes which were missing them.
- Added `InitializeUser` and `QueryUtil` classes to support new feature.
- Added new tests for initial-user & expanded some existing tests.
- `ConnectorMXJUrlTestExample` and `ConnectorMXJObjectTestExample` now demonstrate the initialization of user/password and creating the initial database (rather than using "test").
- Added new connection property `initialize-user` which, if set to `true` will remove the default, un-passworded anonymous and root users, and create the user/password from the connection url.
- Removed obsolete field `SimpleMySqlDynamicMBean.lastInvocation`.
- Clarified code in `DefaultsMap.entrySet()`.
- Removed obsolete `PatchedStandardSocketFactory` java file.
- Added `main(String[])` to `com/mysql/management/AllTestsSuite.java`.
- Errors reading `portFile` are now reported using `stacktrace(err)`, previously `System.err` was used.
- `portFile` now contains a new-line to be consistent with `pidFile`.
- Fixed where `versionString.trim()` was ignored.
- Removed references to `File.deleteOnExit`, a warning is printed instead.

Bugs fixed:

- Changed tests to shutdown `mysqld` prior to deleting files.
- Fixed port file to always be written to `datadir`.
- Added `os.name-os.arch` to resource directory mapping properties file.
- Swapped out commercial binaries for v5.0.40.
- Delete `portFile` on shutdown.
- Moved `platform-map.properties` into `db-files.jar`.
- Clarified the startup max wait numbers.
- Updated `build.xml` in preparation for next beta build.
- Removed `use-default-architecture` property replaced.
- Added null-check to deal with C/MXJ being loaded by the bootstrap classloaders with JVMs for which `getClassLoader()` returns null.

- Added robustness around reading portfile.
- Removed `PatchedStandardSocketFactory` (fixed in Connector/J 5.0.6).
- Refactored duplication from tests and examples to `QueryUtil`.
- Removed obsolete `InitializePasswordExample`

A.2. Changes in MySQL Connector/MXJ 5.0.5 (14 March 2007)

Bugs fixed:

- Moved `MysqldFactory` to main package.
- Reformatting: Added newlines some files which did not end in them.
- Swapped out commercial binaries for v5.0.36.
- Found and removed dynamic linking in `mysql_kill`; updated solution.
- Changed protected constructor of `SimpleMysqldDynamicMBean` from taking a `MysqldResource` to taking a `MysqldFactory`, in order to lay groundwork for addressing BUG discovered by Andrew Rubinger. See: [MySQL Forums](#) (Actual testing with JBoss, and filing a bug, is still required.)
- `build.xml`: `usage` now slightly more verbose; some reformatting.
- Now incorporates Reggie Burnett's `SafeTerminateProcess` and only calls the unsafe `TerminateProcess` as a final last resort.
- New windows `kill.exe` fixes bug where `mysqld` was being force terminated. Issue reported by bruno haleblan and others, see: [MySQL Forums](#).
- Replaced `Boolean.parseBoolean` with JDK 1.4 compliant `valueOf`.
- Changed `connector-mxj.properties` default `mysql` version to 5.0.37.
- In testing so far `mysqld` reliably shuts down cleanly much faster.
- Added testcase to `com.mysql.management.jmx.AcceptanceTest` which demonstrates that `dataDir` is a mutable MBean property.
- Updated `build.xml` in prep for next release.
- Changed `SimpleMysqldDynamicMBean` to create `MysqldResource` on demand in order to allow setting of `datadir`. (Rubinger bug groundwork).
- Clarified the synchronization of `MysqldResource` methods.
- `SIGHUP` is replaced with `MySQLShutdown<PID>` event.
- Clarified the immutability of `baseDir`, `dataDir`, `pidFile`, `portFile`.
- Added 5.1.15 binaries to the repository.
- Removed 5.1.14 binaries from the repository.
- Added `getDataDir()` to interface `MysqldResourceI`.
- Added 5.1.14 binaries to repository.
- Replaced windows `kill.exe` resource with re-written version specific to `mysqld`.
- Added Patched `StandardSocketFactory` from Connector/J 5-0 HEAD.
- Ensured 5.1.14 compatibility.

- Swapped out gpl binaries for v5.0.37.
- Removed 5.0.22 binaries from the repository.

A.3. Changes in MySQL Connector/MXJ 5.0.4 (28 January 2007)

Bugs fixed:

- Allow multiple calls to start server from URL connection on non-3306 port. ([Bug#24004](#))
- Updated `build.xml` to build to handle with different gpl and commercial mysqld version numbers.
- Only populate the options map from the help text if specifically requested or in the MBean case.
- Introduced property for Linux & WinXX to default to 32bit versions.
- Swapped out gpl binaries for v5.0.27.
- Swapped out commercial binaries for v5.0.32.
- Moved mysqld binary resourced into separate jar file NOTICE: `CLASSPATH` will now need to `connector-mxj-db-files.jar`.
- Minor test robustness improvements.
- Moved default version string out of java class into a text editable properties file (`connector-mxj.properties`) in the resources directory.
- Fixed test to be tollerant of `/tmp` being a symlink to `/foo/tmp`.

A.4. Changes in MySQL Connector/MXJ 5.0.3 (24 June 2006)

Bugs fixed:

- Removed unused imports, formatted code, made minor edits to tests.
- Removed "TeeOutputStream" - no longer needed.
- Swapped out the mysqld binaries for MySQL v5.0.22.

A.5. Changes in MySQL Connector/MXJ 5.0.2 (15 June 2006)

Bugs fixed:

- Replaced string parsing with JDBC connection attempt for determining if a mysqld is "ready for connections" `CLASSPATH` will now need to include Connector/J jar.
- "platform" directories replace spaces with underscores
- extracted array and list printing to ListToString utility class
- Swapped out the mysqld binaries for MySQL v5.0.21
- Added trace level logging with Aspect/J. `CLASSPATH` will now need to include `lib/aspectjrt.jar`
- reformatted code
- altered to be "basedir" rather than "port" oriented.

- help parsing test reflects current help options
- insulated users from problems with "." in basedir
- swapped out the mysqld binaries for MySQL v5.0.18
- Made tests more robust by deleting the /tmp/test-c.mxj directory before running tests.
- ServerLauncherSocketFactory.shutdown API change: now takes File parameter (basedir) instead of port.
- socket is now "mysql.sock" in datadir
- added ability to specify "mysql-version" as an url parameter
- Extended timeout for help string parsing, to avoid cases where the help text was getting prematurely flushed, and thus truncated.
- swapped out the mysqld binaries for MySQL v5.0.19
- MysqldResource now tied to dataDir as well as basedir (API CHANGE)
- moved PID file into datadir
- ServerLauncherSocketFactory.shutdown now works across JVMs.
- extracted splitLines(String) to Str utility class
- ServerLauncherSocketFactory.shutdown(port) no longer throws, only reports to System.err
- ServerLauncherSocketFactory now treats URL parameters in the form of `&server.foo=null` as `serverOptionMap.put("foo", null)`
- ServerLauncherSocketFactory.shutdown API change: now takes 2 File parameters (basedir, datadir)

A.6. Changes in MySQL Connector/MXJ 5.0.1 (Never released)

This was an internal only release.

A.7. Changes in MySQL Connector/MXJ 5.0.0 (09 December 2005)

Bugs fixed:

- Removed HelpOptionsParser's need to reference a MysqldResource.
- Reorganized utils into a single "Utils" collaborator.
- Minor test tweaks
- Altered examples and tests to use new Connector/J 5.0 URL syntax for launching Connector/MXJ ("jdbc:mysql:mxj://")
- Swapped out the mysqld binaries for MySQL v5.0.16.
- Ditched "ClassUtil" (merged with Str).
- Minor refactorings for type casting and exception handling.