Building MySQL from Source

Abstract

This is the Building MySQL from Source extract from the MySQL 5.5 Reference Manual.

For help with using MySQL, please visit either the MySQL Forums or MySQL Mailing Lists, where you can discuss your issues with other MySQL users.

For additional documentation on MySQL products, including translations of the documentation into other languages, and downloadable versions in variety of formats, including HTML and PDF formats, see the MySQL Documentation Library.

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Preface and Legal Notices

This is the Building MySQL from Source extract from the MySQL 5.5 Reference Manual.

Legal Notices

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Chapter 1 Installing MySQL from Source

Building MySQL from the source code enables you to customize build parameters, compiler optimizations, and installation location. For a list of systems on which MySQL is known to run, see http://www.mysql.com/support/supportedplatforms/database.html.

Before you proceed with an installation from source, check whether Oracle produces a precompiled binary distribution for your platform and whether it works for you. We put a great deal of effort into ensuring that our binaries are built with the best possible options for optimal performance. Instructions for installing binary distributions are available in Installing MySQL on Unix/Linux Using Generic Binaries.

> **Note**
>
> This section describes how to build MySQL from source using `CMake`. Before MySQL 5.5, source builds used the GNU autotools on Unix-like systems. Source builds on Windows used `CMake`, but the process was different from that described here. For source-building instructions for older versions of MySQL, see the *MySQL 5.1 Reference Manual*. If you are familiar with autotools but not `CMake`, you might find these transition instructions helpful: Autotools to CMake Transition Guide

Source Installation Methods

There are two methods for installing MySQL from source:

- Use a standard MySQL source distribution. To obtain a standard distribution, see How to Get MySQL. For instructions on building from a standard distribution, see Chapter 2, *Installing MySQL Using a Standard Source Distribution*.

  Standard distributions are available as compressed `tar` files, Zip archives, or RPM packages. Distribution files have names of the form `mysql-`*`VERSION`*`.tar.gz`, `mysql-`*`VERSION`*`.zip`, or `mysql-`*`VERSION`*`.rpm`, where *`VERSION`* is a number like `5.5.53`. File names for source distributions can be distinguished from those for precompiled binary distributions in that source distribution names are generic and include no platform name, whereas binary distribution names include a platform name indicating the type of system for which the distribution is intended (for example, `pc-linux-i686` or `winx64`).

- Use a MySQL development tree. For information on building from one of the development trees, see Chapter 3, *Installing MySQL Using a Development Source Tree*.

Source Installation System Requirements

Installation of MySQL from source requires several development tools. Some of these tools are needed no matter whether you use a standard source distribution or a development source tree. Other tool requirements depend on which installation method you use.

To install MySQL from source, the following system requirements must be satisfied, regardless of installation method:

- `CMake`, which is used as the build framework on all platforms. `CMake` can be downloaded from http://www.cmake.org.

- A good `make` program. Although some platforms come with their own `make` implementations, it is highly recommended that you use GNU `make` 3.75 or higher. It may already be available on your system as `gmake`. GNU `make` is available from http://www.gnu.org/software/make/.

- A working ANSI C++ compiler. GCC 4.2.1 or later, Sun Studio 12 or later, Visual Studio 2008 or later, and many current vendor-supplied compilers are known to work.

- Sufficient free memory. If you encounter problems such as “internal compiler error” when compiling large source files, it may be that you have too little memory. If compiling on a virtual machine, try increasing the memory allocation.
- Perl is needed if you intend to run test scripts. Most Unix-like systems include Perl. On Windows, you can use a version such as ActiveState Perl.

To install MySQL from a standard source distribution, one of the following tools is required to unpack the distribution file:

- For a `.tar.gz` compressed `tar` file: GNU `gunzip` to uncompress the distribution and a reasonable `tar` to unpack it. If your `tar` program supports the `z` option, it can both uncompress and unpack the file.

  GNU `tar` is known to work. The standard `tar` provided with some operating systems is not able to unpack the long file names in the MySQL distribution. You should download and install GNU `tar`, or if available, use a preinstalled version of GNU tar. Usually this is available as `gnutar`, `gtar`, or as `tar` within a GNU or Free Software directory, such as `/usr/sfw/bin` or `/usr/local/bin`. GNU `tar` is available from http://www.gnu.org/software/tar/.

- For a `.zip` Zip archive: `WinZip` or another tool that can read `.zip` files.
- For an `.rpm` RPM package: The `rpmbuild` program used to build the distribution unpacks it.

To install MySQL from a development source tree, the following additional tools are required:

- The Git revision control system is required to obtain the development source code. The GitHub Help provides instructions for downloading and installing Git on different platforms. MySQL officially joined GitHub in September, 2014. For more information about MySQL's move to GitHub, refer to the announcement on the MySQL Release Engineering blog: MySQL on GitHub
- `bison` 2.1 or higher, available from http://www.gnu.org/software/bison/. (Version 1 is no longer supported.) Use the latest version of `bison` where possible; if you experience problems, upgrade to a later version, rather than revert to an earlier one.

  `bison` is available from http://www.gnu.org/software/bison/. `bison` for Windows can be downloaded from http://gnuwin32.sourceforge.net/packages/bison.htm. Download the package labeled “Complete package, excluding sources”. On Windows, the default location for `bison` is the `C:\Program Files\GnuWin32` directory. Some utilities may fail to find `bison` because of the space in the directory name. Also, Visual Studio may simply hang if there are spaces in the path. You can resolve these problems by installing into a directory that does not contain a space; for example `C:\GnuWin32`.

- On OpenSolaris and Solaris Express, `m4` must be installed in addition to `bison`. `m4` is available from http://www.gnu.org/software/m4/.

  > **Note**
  >
  > If you have to install any programs, modify your `PATH` environment variable to include any directories in which the programs are located. See Setting Environment Variables.

If you run into problems and need to file a bug report, please use the instructions in How to Report Bugs or Problems.

Chapter 2 Installing MySQL Using a Standard Source Distribution

To install MySQL from a standard source distribution:

1. Verify that your system satisfies the tool requirements listed at Chapter 1, *Installing MySQL from Source*.
2. Obtain a distribution file using the instructions in How to Get MySQL.
3. Configure, build, and install the distribution using the instructions in this section.
4. Perform postinstallation procedures using the instructions in Postinstallation Setup and Testing.

In MySQL 5.5, `CMake` is used as the build framework on all platforms. The instructions given here should enable you to produce a working installation. For additional information on using `CMake` to build MySQL, see How to Build MySQL Server with CMake.

If you start from a source RPM, use the following command to make a binary RPM that you can install. If you do not have `rpmbuild`, use `rpm` instead.

```
shell> rpmbuild --rebuild --clean MySQL-VERSION.src.rpm
```

The result is one or more binary RPM packages that you install as indicated in Installing MySQL on Linux Using RPM Packages.

The sequence for installation from a compressed `tar` file or Zip archive source distribution is similar to the process for installing from a generic binary distribution (see Installing MySQL on Unix/Linux Using Generic Binaries), except that it is used on all platforms and includes steps to configure and compile the distribution. For example, with a compressed `tar` file source distribution on Unix, the basic installation command sequence looks like this:

```
# Preconfiguration setup
shell> groupadd mysql
shell> useradd -r -g mysql -s /bin/false mysql
# Beginning of source-build specific instructions
shell> tar zxvf mysql-VERSION.tar.gz
shell> cd mysql-VERSION
shell> cmake .
shell> make
shell> make install
# End of source-build specific instructions
# Postinstallation setup
shell> cd /usr/local/mysql
shell> chown -R mysql .
shell> chgrp -R mysql .
shell> scripts/mysql_install_db --user=mysql
shell> chown -R root .
shell> chown -R mysql data
# Next command is optional
shell> cp support-files/my-medium.cnf /etc/my.cnf
shell> bin/mysqld_safe --user=mysql &
# Next command is optional
shell> cp support-files/mysql.server /etc/init.d/mysql.server
```

A more detailed version of the source-build specific instructions is shown following.

> **Note**
>
> The procedure shown here does not set up any passwords for MySQL accounts. After following the procedure, proceed to Postinstallation Setup and Testing, for postinstallation setup and testing.

Perform Preconfiguration Setup

On Unix, set up the `mysql` user and group that will be used to run and execute the MySQL server and own the database directory. For details, see Creating a `mysql` System User and Group, in Installing MySQL on Unix/Linux Using Generic Binaries. Then perform the following steps as the `mysql` user, except as noted.

Obtain and Unpack the Distribution

Pick the directory under which you want to unpack the distribution and change location into it.

Obtain a distribution file using the instructions in How to Get MySQL.

Unpack the distribution into the current directory:

- To unpack a compressed `tar` file, `tar` can uncompress and unpack the distribution if it has `z` option support:

  ```
  shell> tar zxvf mysql-VERSION.tar.gz
  ```

  If your `tar` does not have `z` option support, use `gunzip` to unpack the distribution and `tar` to unpack it:

  ```
  shell> gunzip < mysql-VERSION.tar.gz | tar xvf -
  ```

  Alternatively, `CMake` can uncompress and unpack the distribution:

  ```
  shell> cmake -E tar zxvf mysql-VERSION.tar.gz
  ```

- To unpack a Zip archive, use `WinZip` or another tool that can read `.zip` files.

Unpacking the distribution file creates a directory named `mysql-VERSION`.

Configure the Distribution

Change location into the top-level directory of the unpacked distribution:

```
shell> cd mysql-VERSION
```

Configure the source directory. The minimum configuration command includes no options to override configuration defaults:

```
shell> cmake .
```

On Windows, specify the development environment. For example, the following commands configure MySQL for 32-bit or 64-bit builds, respectively:

```
shell> cmake . -G "Visual Studio 9 2008"
shell> cmake . -G "Visual Studio 9 2008 Win64"
```

On OS X, to use the Xcode IDE:

```
shell> cmake . -G Xcode
```

When you run `cmake`, you might want to add options to the command line. Here are some examples:

- `-DBUILD_CONFIG=mysql_release`: Configure the source with the same build options used by Oracle to produce binary distributions for official MySQL releases.

- `-DCMAKE_INSTALL_PREFIX=dir_name`: Configure the distribution for installation under a particular location.
- `-DCPACK_MONOLITHIC_INSTALL=1`: Cause `make package` to generate a single installation file rather than multiple files.
- `-DWITH_DEBUG=1`: Build the distribution with debugging support.

For a more extensive list of options, see Chapter 4, *MySQL Source-Configuration Options*.

To list the configuration options, use one of the following commands:

```
shell> cmake . -L   # overview
shell> cmake . -LH  # overview with help text
shell> cmake . -LAH # all params with help text
shell> ccmake .     # interactive display
```

If `CMake` fails, you might need to reconfigure by running it again with different options. If you do reconfigure, take note of the following:

- If `CMake` is run after it has previously been run, it may use information that was gathered during its previous invocation. This information is stored in `CMakeCache.txt`. When `CMake` starts up, it looks for that file and reads its contents if it exists, on the assumption that the information is still correct. That assumption is invalid when you reconfigure.
- Each time you run `CMake`, you must run `make` again to recompile. However, you may want to remove old object files from previous builds first because they were compiled using different configuration options.

To prevent old object files or configuration information from being used, run these commands on Unix before re-running `CMake`:

```
shell> make clean
shell> rm CMakeCache.txt
```

Or, on Windows:

```
shell> devenv MySQL.sln /clean
shell> del CMakeCache.txt
```

If you build out of the source tree (as described later), the `CMakeCache.txt` file and all built files are in the build directory, so you can remove that directory to object files and cached configuration information.

If you are going to send mail to a MySQL mailing list to ask for configuration assistance, first check the files in the `CMakeFiles` directory for useful information about the failure. To file a bug report, please use the instructions in How to Report Bugs or Problems.

Build the Distribution

On Unix:

```
shell> make
shell> make VERBOSE=1
```

The second command sets `VERBOSE` to show the commands for each compiled source.

Use `gmake` instead on systems where you are using GNU `make` and it has been installed as `gmake`.

On Windows:

```
shell> devenv MySQL.sln /build RelWithDebInfo
```

It is possible to build out of the source tree to keep the tree clean. If the top-level source directory is named `mysql-src` under your current working directory, you can build in a directory named `bld` at the same level like this:

```
shell> mkdir bld
shell> cd bld
shell> cmake ../mysql-src
```

The build directory need not actually be outside the source tree. For example, to build in a directory, you can build in a directory named `bld` under the top-level source tree, do this, starting with `mysql-src` as your current working directory:

```
shell> mkdir bld
shell> cd bld
shell> cmake ..
```

If you have multiple source trees at the same level (for example, to build multiple versions of MySQL), the second strategy can be advantageous. The first strategy places all build directories at the same level, which requires that you choose a unique name for each. With the second strategy, you can use the same name for the build directory within each source tree.

If you have gotten to the compilation stage, but the distribution does not build, see Chapter 5, *Dealing with Problems Compiling MySQL*, for help. If that does not solve the problem, please enter it into our bugs database using the instructions given in How to Report Bugs or Problems. If you have installed the latest versions of the required tools, and they crash trying to process our configuration files, please report that also. However, if you get a `command not found` error or a similar problem for required tools, do not report it. Instead, make sure that all the required tools are installed and that your `PATH` variable is set correctly so that your shell can find them.

Install the Distribution

On Unix:

```
shell> make install
```

This installs the files under the configured installation directory (by default, `/usr/local/mysql`). You might need to run the command as `root`.

To install in a specific directory, add a `DESTDIR` parameter to the command line:

```
shell> make install DESTDIR="/opt/mysql"
```

Alternatively, generate installation package files that you can install where you like:

```
shell> make package
```

This operation produces one or more `.tar.gz` files that can be installed like generic binary distribution packages. See Installing MySQL on Unix/Linux Using Generic Binaries. If you run `CMake` with `-DCPACK_MONOLITHIC_INSTALL=1`, the operation produces a single file. Otherwise, it produces multiple files.

On Windows, generate the data directory, then create a `.zip` archive installation package:

```
shell> devenv MySQL.sln /build RelWithDebInfo /project initial_database
shell> devenv MySQL.sln /build RelWithDebInfo /project package
```

You can install the resulting `.zip` archive where you like. See Installing MySQL on Microsoft Windows Using a noinstall Zip Archive.

Perform Postinstallation Setup

The remainder of the installation process involves setting up the configuration file, creating the core databases, and starting the MySQL server. For instructions, see Postinstallation Setup and Testing.

> **Note**
>
> The accounts that are listed in the MySQL grant tables initially have no passwords. After starting the server, you should set up passwords for them using the instructions in Postinstallation Setup and Testing.

Chapter 3 Installing MySQL Using a Development Source Tree

This section describes how to install MySQL from the latest development source code, which is currently hosted on GitHub. To obtain the MySQL Server source code from this repository hosting service, you can set up a local MySQL Git repository.

On GitHub, MySQL Server and other MySQL projects are found on the MySQL page. The MySQL Server project is a single repository that contains branches for several MySQL series, such as 5.5, 5.6, and 5.7.

MySQL officially joined GitHub in September, 2014. For more information about MySQL's move to GitHub, refer to the announcement on the MySQL Release Engineering blog: MySQL on GitHub

Prerequisites for Installing from Development Source

To install MySQL from a development source tree, your system must satisfy the tool requirements outlined in Chapter 1, *Installing MySQL from Source*.

Setting Up a MySQL Git Repository

To set up a MySQL Git repository on your machine, use this procedure:

1. Clone the MySQL Git repository to your machine. The following command clones the MySQL Git repository to a directory named `mysql-server`. The download size is approximately 437 MB. The initial download will take some time to complete, depending on the speed of your connection.

```
~$ git clone https://github.com/mysql/mysql-server.git
Cloning into 'mysql-server'...
remote: Counting objects: 1035465, done.
remote: Total 1035465 (delta 0), reused 0 (delta 0)
Receiving objects: 100% (1035465/1035465), 437.48 MiB | 5.10 MiB/s, done.
Resolving deltas: 100% (855607/855607), done.
Checking connectivity... done.
Checking out files: 100% (21902/21902), done.
```

2. When the clone operation completes, the contents of your local MySQL Git repository appear similar to the following:

```
~$ cd mysql-server

~/mysql-server$ ls
BUILD            COPYING             libmysqld    regex          tests
BUILD-CMAKE      dbug                libservices  scripts        unittest
client           Docs                man          sql            VERSION
cmake            extra               mysql-test   sql-bench      vio
CMakeLists.txt   include             mysys        sql-common     win
cmd-line-utils   INSTALL-SOURCE      packaging    storage        zlib
config.h.cmake   INSTALL-WIN-SOURCE  plugin       strings
configure.cmake  libmysql            README       support-files
```

3. Use the `git branch -r` command to view the remote tracking branches for the MySQL repository.

```
~/mysql-server$ git branch -r
  origin/5.5
  origin/5.6
  origin/5.7
  origin/HEAD -> origin/5.7
  origin/cluster-7.2
  origin/cluster-7.3
  origin/cluster-7.4
```

4. To view the branches that are checked out in your local repository, issue the `git branch` command. When you cloned the MySQL Git repository, the MySQL 5.7 branch was checked out automatically. The asterisk identifies the 5.7 branch as the active branch.

```
~/mysql-server$ git branch
* 5.7
```

5. To check out a different MySQL branch, run the `git checkout` command, specifying the branch name. For example, to checkout the MySQL 5.5 branch:

   ```
   ~/mysql-server$ git checkout 5.5
   Branch 5.5 set up to track remote branch 5.5 from origin.
   Switched to a new branch '5.5'
   ```

6. Run `git branch` again to verify that the MySQL 5.5 branch is present. MySQL 5.5, which is the last branch you checked out, is marked by an asterisk indicating that it is the active branch.

   ```
   ~/mysql-server$ git branch
   * 5.5
     5.7
   ```

   The `git checkout` command is also used to switch branches. For example, to make MySQL 5.7 the active branch again, you would run `git checkout 5.7`.

7. To obtain changes made after your initial setup of the MySQL Git repository, switch to the branch you want to update and issue the `git pull` command:

   ```
   ~/mysql-server$ git checkout 5.5
   ~/mysql-server$ git pull
   ```

   To examine the commit history, use the `git log` option:

   ```
   ~/mysql-server$ git log
   ```

   You can also browse commit history and source code on the GitHub MySQL site.

   If you see changes or code that you have a question about, send an email to the MySQL `internals` mailing list. See MySQL Mailing Lists. For information about contributing a patch, see Contributing to MySQL Server.

8. After you have cloned the MySQL Git repository and have checked out the branch you want to build, you can build MySQL Server from the source code. Instructions are provided in Chapter 2, *Installing MySQL Using a Standard Source Distribution*, except that you skip the part about obtaining and unpacking the distribution.

   Be careful about installing a build from a distribution source tree on a production machine. The installation command may overwrite your live release installation. If you already have MySQL installed and do not want to overwrite it, run `CMake` with values for the `CMAKE_INSTALL_PREFIX`, `MYSQL_TCP_PORT`, and `MYSQL_UNIX_ADDR` options different from those used by your production server. For additional information about preventing multiple servers from interfering with each other, see Running Multiple MySQL Instances on One Machine.

   Play hard with your new installation. For example, try to make new features crash. Start by running `make test`. See The MySQL Test Suite.

Chapter 4 MySQL Source-Configuration Options

The `CMake` program provides a great deal of control over how you configure a MySQL source distribution. Typically, you do this using options on the `CMake` command line. For information about options supported by `CMake`, run either of these commands in the top-level source directory:

```
shell> cmake . -LH
shell> ccmake .
```

You can also affect `CMake` using certain environment variables. See Environment Variables.

The following table shows the available `CMake` options. In the `Default` column, `PREFIX` stands for the value of the `CMAKE_INSTALL_PREFIX` option, which specifies the installation base directory. This value is used as the parent location for several of the installation subdirectories.

Table 4.1 MySQL Source-Configuration Option Reference (`CMake`)

Formats	Description	Default	Introduced
`BUILD_CONFIG`	Use same build options as official releases		5.5.7
`CMAKE_BUILD_TYPE`	Type of build to produce	`RelWithDebInfo`	5.5.7
`CMAKE_CXX_FLAGS`	Flags for C++ Compiler		
`CMAKE_C_FLAGS`	Flags for C Compiler		
`CMAKE_INSTALL_PREFIX`	Installation base directory	`/usr/local/mysql`	5.5.8
`COMPILATION_COMMENT`	Comment about compilation environment		5.5.7
`CPACK_MONOLITHIC_INSTALL`	Whether package build produces single file	`OFF`	5.5.7
`DEFAULT_CHARSET`	The default server character set	`latin1`	5.5.7
`DEFAULT_COLLATION`	The default server collation	`latin1_swedish_ci`	5.5.7
`ENABLED_LOCAL_INFILE`	Whether to enable LOCAL for LOAD DATA INFILE	`OFF`	5.5.7
`ENABLED_PROFILING`	Whether to enable query profiling code	`ON`	5.5.7
`ENABLE_DEBUG_SYNC`	Whether to enable Debug Sync support	`ON`	5.5.7
`ENABLE_DOWNLOADS`	Whether to download optional files	`OFF`	5.5.7
`ENABLE_DTRACE`	Whether to include DTrace support		5.5.7
`ENABLE_GCOV`	Whether to include gcov support		5.5.14
`IGNORE_AIO_CHECK`	With -DBUILD_CONFIG=mysql_release, ignore libaio check	`OFF`	5.5.9
`INSTALL_BINDIR`	User executables directory	`PREFIX/bin`	5.5.7
`INSTALL_DOCDIR`	Documentation directory	`PREFIX/docs`	5.5.7
`INSTALL_DOCREADMEDIR`	README file directory	`PREFIX`	5.5.7
`INSTALL_INCLUDEDIR`	Header file directory	`PREFIX/include`	5.5.7
`INSTALL_INFODIR`	Info file directory	`PREFIX/docs`	5.5.7

Formats	Description	Default	Introduced
INSTALL_LAYOUT	Select predefined installation layout	STANDALONE	5.5.7
INSTALL_LIBDIR	Library file directory	PREFIX/lib	5.5.7
INSTALL_MANDIR	Manual page directory	PREFIX/man	5.5.7
INSTALL_MYSQLSHAREDIR	Shared data directory	PREFIX/share	5.5.7
INSTALL_MYSQLTESTDIR	mysql-test directory	PREFIX/mysql-test	5.5.7
INSTALL_PLUGINDIR	Plugin directory	PREFIX/lib/plugin	5.5.7
INSTALL_SBINDIR	Server executable directory	PREFIX/bin	5.5.7
INSTALL_SCRIPTDIR	Scripts directory	PREFIX/scripts	5.5.7
INSTALL_SHAREDIR	aclocal/mysql.m4 installation directory	PREFIX/share	5.5.7
INSTALL_SQLBENCHDIR	sql-bench directory	PREFIX	5.5.7
INSTALL_SUPPORTFILESDIR	Extra support files directory	PREFIX/support-files	5.5.7
MEMCACHED_HOME	Path to memcached	[none]	5.5.16-ndb-7.2.2
MYSQL_DATADIR	Data directory		5.5.7
MYSQL_MAINTAINER_MODE	Whether to enable MySQL maintainer-specific development environment	OFF	5.5.7
MYSQL_PROJECT_NAME	Windows/OS X project name	3306	5.5.21
MYSQL_TCP_PORT	TCP/IP port number	3306	5.5.7
MYSQL_UNIX_ADDR	Unix socket file	/tmp/mysql.sock	5.5.7
ODBC_INCLUDES	ODBC includes directory		
ODBC_LIB_DIR	ODBC library directory		
SYSCONFDIR	Option file directory		5.5.7
TMPDIR	tmpdir default value		5.5.36
WITHOUT_SERVER	Do not build the server	OFF	
WITHOUT_xxx_STORAGE_ENGINE	Exclude storage engine xxx from build		5.5.7
WITH_ASAN	Enable AddressSanitizer	OFF	5.5.35
WITH_BUNDLED_LIBEVENT	Use bundled libevent when building ndbmemcache	ON	5.5.16-ndb-7.2.2
WITH_BUNDLED_MEMCACHED	Use bundled memcached when building ndbmemcache	ON	5.5.16-ndb-7.2.2
WITH_CLASSPATH	Classpath to use when building MySQL Cluster Connector for Java. Default is an empty string.		
WITH_DEBUG	Whether to include debugging support	OFF	5.5.7
WITH_EMBEDDED_SERVER	Whether to build embedded server	OFF	5.5.7

Formats	Description	Default	Introduced
WITH_EMBEDDED_SHARED_LIBRARY	Whether to build a shared embedded server library	OFF	5.5.37
WITH_ERROR_INSERT	Enable error injection in the NDB storage engine. Should not be used for building binaries intended for production.	OFF	
WITH_EXTRA_CHARSETS	Which extra character sets to include	all	5.5.7
WITH_LIBEDIT	Use bundled libedit library	ON	5.5.7
WITH_LIBWRAP	Whether to include libwrap (TCP wrappers) support	OFF	5.5.7
WITH_NDBCLUSTER	Build the NDB storage engine; alias for WITH_NDBCLUSTER_STORAGE_ENGINE	ON	
WITH_NDBCLUSTER_STORAGE_ENGINE	Build the NDB storage engine	ON	
WITH_NDBMTD	Build multi-threaded data node.	ON	
WITH_NDB_BINLOG	Enable binary logging by default by mysqld.	ON	
WITH_NDB_DEBUG	Produce a debug build for testing or troubleshooting.	OFF	
WITH_NDB_JAVA	Enable building of Java and ClusterJ support. Enabled by default. Supported in MySQL Cluster only.	ON	5.5.27-ndb-7.2.9
WITH_NDB_PORT	Default port used by a management server built with this option. If this option was not used to build it, the management server's default port is 1186.	[none]	
WITH_NDB_TEST	Include NDB API test programs.	OFF	
WITH_READLINE	Use bundled readline library	OFF	5.5.7
WITH_SSL	Type of SSL support	bundled	5.5.7
WITH_UNIXODBC	Enable unixODBC support	OFF	
WITH_VALGRIND	Whether to compile in Valgrind header files	OFF	5.5.6
WITH_ZLIB	Type of zlib support	bundled	5.5.7
WITH_xxx_STORAGE_ENGINE	Compile storage engine xxx statically into server		5.5.7

The following sections provide more information about CMake options.

- General Options
- Installation Layout Options
- Storage Engine Options
- Feature Options
- Compiler Flags

- CMake Options for Compiling MySQL Cluster

For boolean options, the value may be specified as 1 or `ON` to enable the option, or as 0 or `OFF` to disable the option.

Many options configure compile-time defaults that can be overridden at server startup. For example, the `CMAKE_INSTALL_PREFIX`, `MYSQL_TCP_PORT`, and `MYSQL_UNIX_ADDR` options that configure the default installation base directory location, TCP/IP port number, and Unix socket file can be changed at server startup with the `--basedir`, `--port`, and `--socket` options for `mysqld`. Where applicable, configuration option descriptions indicate the corresponding `mysqld` startup option.

General Options

- `-DBUILD_CONFIG=mysql_release`

  This option configures a source distribution with the same build options used by Oracle to produce binary distributions for official MySQL releases.

- `-DCMAKE_BUILD_TYPE=`*`type`*

  The type of build to produce:

  - `RelWithDebInfo`: Enable optimizations and generate debugging information. This is the default MySQL build type.
  - `Debug`: Disable optimizations and generate debugging information. This build type is also used if the `WITH_DEBUG` option is enabled. That is, `-DWITH_DEBUG=1` has the same effect as `-DCMAKE_BUILD_TYPE=Debug`.

- `-DCPACK_MONOLITHIC_INSTALL=`*`bool`*

  This option affects whether the `make package` operation produces multiple installation package files or a single file. If disabled, the operation produces multiple installation package files, which may be useful if you want to install only a subset of a full MySQL installation. If enabled, it produces a single file for installing everything.

Installation Layout Options

The `CMAKE_INSTALL_PREFIX` option indicates the base installation directory. Other options with names of the form `INSTALL_`*`xxx`* that indicate component locations are interpreted relative to the prefix and their values are relative pathnames. Their values should not include the prefix.

- `-DCMAKE_INSTALL_PREFIX=`*`dir_name`*

  The installation base directory.

  This value can be set at server startup with the `--basedir` option.

- `-DINSTALL_BINDIR=`*`dir_name`*

  Where to install user programs.

- `-DINSTALL_DOCDIR=`*`dir_name`*

  Where to install documentation.

- `-DINSTALL_DOCREADMEDIR=`*`dir_name`*

  Where to install `README` files.

- `-DINSTALL_INCLUDEDIR=`*`dir_name`*

Where to install header files.

- `-DINSTALL_INFODIR=dir_name`

  Where to install Info files.

- `-DINSTALL_LAYOUT=name`

  Select a predefined installation layout:

  - `STANDALONE`: Same layout as used for `.tar.gz` and `.zip` packages. This is the default.
  - `RPM`: Layout similar to RPM packages.
  - `SVR4`: Solaris package layout.
  - `DEB`: DEB package layout (experimental).

  You can select a predefined layout but modify individual component installation locations by specifying other options. For example:

```
shell> cmake . -DINSTALL_LAYOUT=SVR4 -DMYSQL_DATADIR=/var/mysql/data
```

- `-DINSTALL_LIBDIR=dir_name`

  Where to install library files.

- `-DINSTALL_MANDIR=dir_name`

  Where to install manual pages.

- `-DINSTALL_MYSQLSHAREDIR=dir_name`

  Where to install shared data files.

- `-DINSTALL_MYSQLTESTDIR=dir_name`

  Where to install the `mysql-test` directory. As of MySQL 5.5.32, to suppress installation of this directory, explicitly set the option to the empty value (`-DINSTALL_MYSQLTESTDIR=`).

- `-DINSTALL_PLUGINDIR=dir_name`

  The location of the plugin directory.

  This value can be set at server startup with the `--plugin_dir` option.

- `-DINSTALL_SBINDIR=dir_name`

  Where to install the `mysqld` server.

- `-DINSTALL_SCRIPTDIR=dir_name`

  Where to install `mysql_install_db`.

- `-DINSTALL_SHAREDIR=dir_name`

  Where to install `aclocal/mysql.m4`.

- `-DINSTALL_SQLBENCHDIR=dir_name`

  Where to install the `sql-bench` directory. To suppress installation of this directory, explicitly set the option to the empty value (`-DINSTALL_SQLBENCHDIR=`).

- `-DINSTALL_SUPPORTFILESDIR=dir_name`

  Where to install extra support files.

- `-DMYSQL_DATADIR=dir_name`

  The location of the MySQL data directory.

  This value can be set at server startup with the `--datadir` option.

- `-DODBC_INCLUDES=dir_name`

  The location of the ODBC includes directory, and may be used while configuring Connector/ODBC.

- `-DODBC_LIB_DIR=dir_name`

  The location of the ODBC library directory, and may be used while configuring Connector/ODBC.

- `-DSYSCONFDIR=dir_name`

  The default `my.cnf` option file directory.

  This location cannot be set at server startup, but you can start the server with a given option file using the `--defaults-file=file_name` option, where *`file_name`* is the full path name to the file.

- `-DTMPDIR=dir_name`

  The default location to use for the `tmpdir` system variable. If unspecified, the value defaults to `P_tmpdir` in `<stdio.h>`. This option was added in MySQL 5.6.16.

Storage Engine Options

Storage engines are built as plugins. You can build a plugin as a static module (compiled into the server) or a dynamic module (built as a dynamic library that must be installed into the server using the `INSTALL PLUGIN` statement or the `--plugin-load` option before it can be used). Some plugins might not support static or dynamic building.

The `MyISAM`, `MERGE`, `MEMORY`, and `CSV` engines are mandatory (always compiled into the server) and need not be installed explicitly.

To compile a storage engine statically into the server, use `-DWITH_engine_STORAGE_ENGINE=1`. Some permissible *`engine`* values are `ARCHIVE`, `BLACKHOLE`, `EXAMPLE`, `FEDERATED`, `INNOBASE` (`InnoDB`), `NDBCLUSTER` (`NDB`), `PARTITION` (partitioning support), and `PERFSCHEMA` (Performance Schema). Examples:

```
-DWITH_INNOBASE_STORAGE_ENGINE=1
-DWITH_ARCHIVE_STORAGE_ENGINE=1
-DWITH_BLACKHOLE_STORAGE_ENGINE=1
-DWITH_PERFSCHEMA_STORAGE_ENGINE=1
```

> **Note**
>
> `WITH_NDBCLUSTER_STORAGE_ENGINE` is supported only when building MySQL Cluster using the MySQL Cluster sources. It cannot be used to enable clustering support in other MySQL source trees or distributions. In MySQL Cluster NDB 7.2 source distributions, it is enabled by default. See Building MySQL Cluster from Source on Linux, and Compiling and Installing MySQL Cluster from Source on Windows, for more information.

To exclude a storage engine from the build, use `-DWITHOUT_engine_STORAGE_ENGINE=1`. Examples:

```
-DWITHOUT_EXAMPLE_STORAGE_ENGINE=1
-DWITHOUT_FEDERATED_STORAGE_ENGINE=1
-DWITHOUT_PARTITION_STORAGE_ENGINE=1
```

If neither `-DWITH_engine_STORAGE_ENGINE` nor `-DWITHOUT_engine_STORAGE_ENGINE` are specified for a given storage engine, the engine is built as a shared module, or excluded if it cannot be built as a shared module.

Feature Options

- `-DCOMPILATION_COMMENT=string`

  A descriptive comment about the compilation environment.

- `-DDEFAULT_CHARSET=charset_name`

  The server character set. By default, MySQL uses the `latin1` (cp1252 West European) character set.

  charset_name may be one of `binary`, `armscii8`, `ascii`, `big5`, `cp1250`, `cp1251`, `cp1256`, `cp1257`, `cp850`, `cp852`, `cp866`, `cp932`, `dec8`, `eucjpms`, `euckr`, `gb2312`, `gbk`, `geostd8`, `greek`, `hebrew`, `hp8`, `keybcs2`, `koi8r`, `koi8u`, `latin1`, `latin2`, `latin5`, `latin7`, `macce`, `macroman`, `sjis`, `swe7`, `tis620`, `ucs2`, `ujis`, `utf8`, `utf8mb4`, `utf16`, `utf32`. The permissible character sets are listed in the `cmake/character_sets.cmake` file as the value of `CHARSETS_AVAILABLE`.

  This value can be set at server startup with the `--character_set_server` option.

- `-DDEFAULT_COLLATION=collation_name`

  The server collation. By default, MySQL uses `latin1_swedish_ci`. Use the `SHOW COLLATION` statement to determine which collations are available for each character set.

  This value can be set at server startup with the `--collation_server` option.

- `-DENABLE_DEBUG_SYNC=bool`

  Whether to compile the Debug Sync facility into the server. This facility is used for testing and debugging. This option is enabled by default, but has no effect unless MySQL is configured with debugging enabled. If debugging is enabled and you want to disable Debug Sync, use `-DENABLE_DEBUG_SYNC=0`.

  When compiled in, Debug Sync is disabled by default at runtime. To enable it, start `mysqld` with the `--debug-sync-timeout=N` option, where *N* is a timeout value greater than 0. (The default value is 0, which disables Debug Sync.) *N* becomes the default timeout for individual synchronization points.

  For a description of the Debug Sync facility and how to use synchronization points, see MySQL Internals: Test Synchronization.

- `-DENABLE_DOWNLOADS=bool`

  Whether to download optional files. For example, with this option enabled, `CMake` downloads the Google Test distribution that is used by the test suite to run unit tests.

- `-DENABLE_DTRACE=bool`

  Whether to include support for DTrace probes. For information about DTrace, wee Tracing mysqld Using DTrace

- `-DENABLE_GCOV=bool`

  Whether to include gcov support (Linux only).

- `-DENABLED_LOCAL_INFILE=bool`

  Whether to enable `LOCAL` capability in the client library for `LOAD DATA INFILE`.

  This option controls client-side `LOCAL` capability, but the capability can be set on the server side at server startup with the `--local-infile` option. See Security Issues with LOAD DATA LOCAL.

- `-DENABLED_PROFILING=bool`

  Whether to enable query profiling code (for the `SHOW PROFILE` and `SHOW PROFILES` statements).

- `-DIGNORE_AIO_CHECK=bool`

  If the `-DBUILD_CONFIG=mysql_release` option is given on Linux, the `libaio` library must be linked in by default. If you do not have `libaio` or do not want to install it, you can suppress the check for it by specifying `-DIGNORE_AIO_CHECK=1`. This option was added in MySQL 5.5.9.

- `-DMYSQL_MAINTAINER_MODE=bool`

  Whether to enable a MySQL maintainer-specific development environment. If enabled, this option causes compiler warnings to become errors.

- `-DMYSQL_PROJECT_NAME=name`

  For Windows or OS X, the project name to incorporate into the project file name. This option was added in MySQL 5.5.21.

- `-DMYSQL_TCP_PORT=port_num`

  The port number on which the server listens for TCP/IP connections. The default is 3306.

  This value can be set at server startup with the `--port` option.

- `-DMYSQL_UNIX_ADDR=file_name`

  The Unix socket file path on which the server listens for socket connections. This must be an absolute path name. The default is `/tmp/mysql.sock`.

  This value can be set at server startup with the `--socket` option.

- `-DWITH_ASAN=bool`

  Whether to enable AddressSanitizer, for compilers that support it. The default is off. This option was added in MySQL 5.5.35.

- `-DWITH_DEBUG=bool`

  Whether to include debugging support.

  Configuring MySQL with debugging support enables you to use the `--debug="d,parser_debug"` option when you start the server. This causes the Bison parser that is used to process SQL statements to dump a parser trace to the server's standard error output. Typically, this output is written to the error log.

- `-DWITH_EMBEDDED_SERVER=bool`

  Whether to build the `libmysqld` embedded server library.

- `-DWITH_EMBEDDED_SHARED_LIBRARY=bool`

  Whether to build a shared `libmysqld` embedded server library. This option was added in MySQL 5.5.37.

- `-DWITH_EXTRA_CHARSETS=name`

Which extra character sets to include:

- `all`: All character sets. This is the default.
- `complex`: Complex character sets.
- `none`: No extra character sets.

- `-DWITH_LIBEDIT=bool`

  Whether to use the `libedit` library bundled with the distribution.

- `-DWITH_LIBWRAP=bool`

  Whether to include `libwrap` (TCP wrappers) support.

- `-DWITH_READLINE=bool`

  Whether to use the `readline` library bundled with the distribution.

- `-DWITH_SSL=ssl_type`

  The type of SSL support to include, if any:

  - `no`: No SSL support. This is the default.
  - `yes`: Use the system SSL library if present, else the library bundled with the distribution.
  - `bundled`: Use the SSL library bundled with the distribution.
  - `system`: Use the system SSL library.

  For information about using SSL support, see Using Secure Connections.

- `-DWITH_UNIXODBC=1`

  Enables unixODBC support, for Connector/ODBC.

- `-DWITH_VALGRIND=bool`

  Whether to compile in the Valgrind header files, which exposes the Valgrind API to MySQL code. The default is `OFF`.

  To generate a Valgrind-aware debug build, `-DWITH_VALGRIND=1` normally is combined with `-DWITH_DEBUG=1`. See Building Debug Configurations.

- `-DWITH_ZLIB=zlib_type`

  Some features require that the server be built with compression library support, such as the `COMPRESS()` and `UNCOMPRESS()` functions, and compression of the client/server protocol. The `WITH_ZLIB` indicates the source of `zlib` support:

  - `bundled`: Use the `zlib` library bundled with the distribution. This is the default.
  - `system`: Use the system `zlib` library.

- `-DWITHOUT_SERVER=bool`

  Whether to build without the MySQL server. The default is `OFF`, which does build the server.

Compiler Flags

- `-DCMAKE_C_FLAGS="flags"`

Flags for the C Compiler.

- `-DCMAKE_CXX_FLAGS="flags"`

  Flags for the C++ Compiler.

To specify your own C and C++ compiler flags, for flags that do not affect optimization, use the `CMAKE_C_FLAGS` and `CMAKE_CXX_FLAGS` CMake options.

When providing your own compiler flags, you might want to specify `CMAKE_BUILD_TYPE` as well.

For example, to create a 32-bit release build on a 64-bit Linux machine, do this:

```
shell> mkdir bld
shell> cd bld
shell> cmake .. -DCMAKE_C_FLAGS=-m32 \
         -DCMAKE_CXX_FLAGS=-m32 \
         -DCMAKE_BUILD_TYPE=RelWithDebInfo
```

If you set flags that affect optimization (`-Onumber`), you must set the `CMAKE_C_FLAGS_build_type` and/or `CMAKE_CXX_FLAGS_build_type` options, where `build_type` corresponds to the `CMAKE_BUILD_TYPE` value. To specify a different optimization for the default build type (`RelWithDebInfo`) set the `CMAKE_C_FLAGS_RELWITHDEBINFO` and `CMAKE_CXX_FLAGS_RELWITHDEBINFO` options. For example, to compile on Linux with `-O3` and with debug symbols, do this:

```
shell> cmake .. -DCMAKE_C_FLAGS_RELWITHDEBINFO="-O3 -g" \
         -DCMAKE_CXX_FLAGS_RELWITHDEBINFO="-O3 -g"
```

CMake Options for Compiling MySQL Cluster

The following options are for use when building MySQL Cluster NDB 7.2 or later. These options are supported only with the MySQL Cluster NDB 7.2 and later MySQL Cluster sources; they are not supported when using sources from the MySQL 5.5 Server tree.

- `-DMEMCACHED_HOME=dir_name`

  Perform the build using the memcached (version 1.6 or later) installed in the system directory indicated by `dir_name`. Files from this installation that are used in the build include the memcached binary, header files, and libraries, as well as the `memcached_utilities` library and the header file `engine_testapp.h`.

  You must leave this option unset when building `ndbmemcache` using the bundled memcached sources (`WITH_BUNDLED_MEMCACHED` option); in other words, the bundled sources are used by default).

  This option was added in MySQL Cluster NDB 7.2.2.

  While additional `CMake` options—such as for SASL authorization and for providing `dtrace` support—are available for use when compiling `memcached` from external sources, these options are currently not enabled for the `memcached` sources bundled with MySQL Cluster.

- `-DWITH_BUNDLED_LIBEVENT={ON|OFF}`

  Use the `libevent` included in the MySQL Cluster sources when building MySQL Cluster with ndbmemcached support (MySQL Cluster NDB 7.2.2 and later). Enabled by default. OFF causes the system's libevent to be used instead.

- `-DWITH_BUNDLED_MEMCACHED={ON|OFF}`

Build the memcached sources included in the MySQL Cluster source tree (MySQL Cluster NDB 7.2.3 and later), then use the resulting memcached server when building the ndbmemcache engine. In this case, `make install` places the `memcached` binary in the installation `bin` directory, and the ndbmemcache engine shared library file `ndb_engine.so` in the installation `lib` directory.

This option is ON by default.

- `-DWITH_CLASSPATH=`*`path`*

  Sets the classpath for building MySQL Cluster Connector for Java. The default is empty. In MySQL Cluster NDB 7.2.9 and later, this option is ignored if `-DWITH_NDB_JAVA=OFF` is used.

- `-DWITH_ERROR_INSERT={ON|OFF}`

  Enables error injection in the `NDB` kernel. For testing only; not intended for use in building production binaries. The default is `OFF`.

- `-DWITH_NDBCLUSTER_STORAGE_ENGINE={ON|OFF}`

  Build and link in support for the `NDB` (`NDBCLUSTER`) storage engine in `mysqld`. The default is `ON`.

- `-DWITH_NDBCLUSTER={ON|OFF}`

  This is an alias for `WITH_NDBCLUSTER_STORAGE_ENGINE`.

- `-DWITH_NDBMTD={ON|OFF}`

  Build the multi-threaded data node executable `ndbmtd`. The default is `ON`.

- `-DWITH_NDB_BINLOG={ON|OFF}`

  Enable binary logging by default in the `mysqld` built using this option. ON by default.

- `-DWITH_NDB_DEBUG={ON|OFF}`

  Enable building the debug versions of the MySQL Cluster binaries. OFF by default.

- `-DWITH_NDB_JAVA={ON|OFF}`

  Enable building MySQL Cluster with Java support, including `ClusterJ`.

  This option was added in MySQL Cluster NDB 7.2.9, and is ON by default. If you do not wish to compile MySQL Cluster with Java support, you must disable it explicitly by specifying `-DWITH_NDB_JAVA=OFF` when running `CMake`. Otherwise, if Java cannot be found, configuration of the build fails.

- `-DWITH_NDB_PORT=`*`port`*

  Causes the MySQL Cluster management server (`ndb_mgmd`) that is built to use this *`port`* by default. If this option is unset, the resulting management server tries to use port 1186 by default.

- `-DWITH_NDB_TEST={ON|OFF}`

  If enabled, include a set of NDB API test programs. The default is OFF.

Chapter 5 Dealing with Problems Compiling MySQL

The solution to many problems involves reconfiguring. If you do reconfigure, take note of the following:

- If `CMake` is run after it has previously been run, it may use information that was gathered during its previous invocation. This information is stored in `CMakeCache.txt`. When `CMake` starts up, it looks for that file and reads its contents if it exists, on the assumption that the information is still correct. That assumption is invalid when you reconfigure.
- Each time you run `CMake`, you must run `make` again to recompile. However, you may want to remove old object files from previous builds first because they were compiled using different configuration options.

To prevent old object files or configuration information from being used, run the following commands before re-running `CMake`:

On Unix:

```
shell> make clean
shell> rm CMakeCache.txt
```

On Windows:

```
shell> devenv MySQL.sln /clean
shell> del CMakeCache.txt
```

If you build outside of the source tree, remove and recreate your build directory before re-running `CMake`. For instructions on building outside of the source tree, see How to Build MySQL Server with CMake.

On some systems, warnings may occur due to differences in system include files. The following list describes other problems that have been found to occur most often when compiling MySQL:

- To define which C and C++ compilers to use, you can define the `CC` and `CXX` environment variables. For example:

  ```
  shell> CC=gcc
  shell> CXX=g++
  shell> export CC CXX
  ```

  To specify your own C and C++ compiler flags, use the `CMAKE_C_FLAGS` and `CMAKE_CXX_FLAGS` CMake options. See Compiler Flags.

  To see what flags you might need to specify, invoke `mysql_config` with the `--cflags` option.

- To see what commands are executed during the compile stage, after using `CMake` to configure MySQL, run `make VERBOSE=1` rather than just `make`.
- If compilation fails, check whether the `MYSQL_MAINTAINER_MODE` option is enabled. This mode causes compiler warnings to become errors, so disabling it may enable compilation to proceed.
- If your compile fails with errors such as any of the following, you must upgrade your version of `make` to GNU `make`:

  ```
  make: Fatal error in reader: Makefile, line 18:
  Badly formed macro assignment
  ```

  Or:

  ```
  ```

```
make: file `Makefile' line 18: Must be a separator (:
```

Or:

```
pthread.h: No such file or directory
```

Solaris and FreeBSD are known to have troublesome `make` programs.

GNU `make` 3.75 is known to work.

- The `sql_yacc.cc` file is generated from `sql_yacc.yy`. Normally, the build process does not need to create `sql_yacc.cc` because MySQL comes with a pregenerated copy. However, if you do need to re-create it, you might encounter this error:

  ```
  "sql_yacc.yy", line xxx fatal: default action causes potential...
  ```

  This is a sign that your version of `yacc` is deficient. You probably need to install a recent version of `bison` (the GNU version of `yacc`) and use that instead.

  Versions of `bison` older than 1.75 may report this error:

  ```
  sql_yacc.yy:#####: fatal error: maximum table size (32767) exceeded
  ```

  The maximum table size is not actually exceeded; the error is caused by bugs in older versions of `bison`.

For information about acquiring or updating tools, see the system requirements in Chapter 1, *Installing MySQL from Source*.