Building MySQL from Source
Abstract

This is the Building MySQL from Source extract from the MySQL 8.0 Reference Manual.

For legal information, see the Legal Notices.

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

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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

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.

If you are interested in building MySQL from a source distribution using build options the same as
or similar to those use by Oracle to produce binary distributions on your platform, obtain a binary
distribution, unpack it, and look in the docs/INFO_BIN file, which contains information about how that
MySQL distribution was configured and compiled.

Warning
Building MySQL with nonstandard options may lead to reduced functionality,
performance, or security.

The MySQL source code contains internal documentation written using Doxygen. The generated
Doxygen content is available at https://dev.mysql.com/doc/index-other.html. It is also possible to
generate this content locally from a MySQL source distribution using the instructions at Generating
MySQL Doxygen Documentation Content.
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 Source Installation Prerequisites.
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.

MySQL uses CMake 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 from Oracle.

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> mkdir bld
shell> cd bld
shell> cmake ..
shell> make
shell> make install
# End of source-build specific instructions
# Postinstallation setup
shell> cd /usr/local/mysql
shell> mkdir mysql-files
shell> chown mysql:mysql mysql-files
shell> chmod 750 mysql-files
shell> bin/mysql --initialize --user=mysql
shell> bin/mysql_ssl_rsa_setup
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
- Obtain and Unpack the Distribution
Perform Preconfiguration Setup

- Configure the Distribution
- Build the Distribution
- Install the Distribution
- Perform Postinstallation Setup

Perform Preconfiguration Setup

On Unix, set up the mysql user and group that should be used to run and execute the MySQL server, and own the database directory. For details, see Create a mysql User and Group. 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 xzvf 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 xzvf 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

Build outside 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. Create the directory and go there:

shell> mkdir bld
shell> cd bld

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

shell> cmake ../mysql-src

The build directory needs not be outside the source tree. For example, you can build in a directory named bld under the top-level source tree. To do this, starting with mysql-src as your current working directory, create the directory bld and then go there:

shell> mkdir bld
shell> cd bld
Configure the build directory. The minimum configuration command includes no options to override configuration defaults:

```
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. The following instructions assume this second strategy.

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 12 2013"
shell> cmake .. -G "Visual Studio 12 2013 Win64"
```

On macOS, 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, 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 in the build directory 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
```
Build the Distribution

On Unix:

```shell
make
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
deenv MySQL.sln /build RelWithDebInfo
```

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
deenv MySQL.sln /build RelWithDebInfo /project initial_database
deenv 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 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.

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
- Setting Up a MySQL Git Repository

Prerequisites for Installing from Development Source

To install MySQL from a development source tree, your system must satisfy the tool requirements listed at Source Installation Prerequisites.

Setting Up a MySQL Git Repository

To set up a MySQL Git repository on your machine:

1. Clone the MySQL Git repository to your machine. The following command clones the MySQL Git repository to a directory named mysql-server. The initial download may 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: 1198513, done.
   remote: Total 1198513 (delta 0), reused 0 (delta 0), pack-reused 1198513
   Receiving objects: 100% (1198513/1198513), 1.01 GiB | 7.44 MiB/s, done.
   Resolving deltas: 100% (993200/993200), done.
   Checking connectivity... done.
   Checking out files: 100% (25510/25510), 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
   client  extra  mysys  storage
   cmake   include  packaging  strings
   CMakeLists.txt  INSTALL  plugin  support-files
   components  libbinlogevents  README  testclients
   config.h.cmake  libbinlogstandalone  router  unittest
   configure.cmake  libmysql  run_doxygen.cmake  utilities
   Docs  libservices  scripts  VERSION
   Doxyfile-ignored  LICENSE  share  vio
   Doxyfile.in  man  sql  win
   doxygen_resources  mysql-test  sql-common
   ```

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/8.0
   origin/HEAD -> origin/8.0
   origin/cluster-7.2
   ```
4. To view the branch that is checked out in your local repository, issue the `git branch` command. When you clone the MySQL Git repository, the latest MySQL GA branch is checked out automatically. The asterisk identifies the active branch.

```bash
~/mysql-server$ git branch
 * 8.0
```

5. To check out an earlier MySQL branch, run the `git checkout` command, specifying the branch name. For example, to check out the MySQL 5.7 branch:

```bash
~/mysql-server$ git checkout 5.7
Checking out files: 100% (9600/9600), done.
Branch 5.7 set up to track remote branch 5.7 from origin.
Switched to a new branch '5.7'
```

6. 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:

```bash
~/mysql-server$ git checkout 8.0
~/mysql-server$ git pull
```

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

```bash
~/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, ask on the MySQL Community Slack. For information about contributing a patch, see Contributing to MySQL Server.

7. 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:

cmake . -LH  
cmake .

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

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.

The following sections provide more information about CMake options.

• CMake Option Reference
• General Options
• Installation Layout Options
• Storage Engine Options
• Feature Options
• Compiler Flags
• CMake Options for Compiling NDB Cluster

CMake Option Reference

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)

<table>
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<th>Description</th>
<th>Default</th>
<th>Introduced</th>
<th>Removed</th>
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<td>Whether to enable generation of .gdb_index section in binaries</td>
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<tr>
<td>BUILD_CONFIG</td>
<td>Use same build options as official releases</td>
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<td></td>
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<tr>
<td>BUNDLE_RUNTIME_LIBRARIES</td>
<td>Bundle runtime libraries with server MSI and Zip packages for Windows</td>
<td>OFF</td>
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<td></td>
</tr>
<tr>
<td>CMAKE_BUILD_TYPE</td>
<td>Type of build to produce</td>
<td>RelWithDebInfo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMAKE_CXX_FLAGS</td>
<td>Flags for C++ Compiler</td>
<td></td>
<td></td>
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<tr>
<td>CMAKE_C_FLAGS</td>
<td>Flags for C Compiler</td>
<td></td>
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<td></td>
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<td>CMAKE_INSTALL_PREFIX</td>
<td>Installation base directory</td>
<td>/usr/local/mysql</td>
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<td>Formats</td>
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<tr>
<td>COMPILATION_COMMENT</td>
<td>Comment about compilation environment</td>
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<tr>
<td>COMPILATION_COMMENT_SERVER</td>
<td>Comment about compilation environment for use by mysqld</td>
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<tr>
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<td>Compress debug sections of binary executables</td>
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<td>Whether package build produces single file</td>
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<td>DEFAULT_CHARSET</td>
<td>The default server character set</td>
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<td>The default server collation</td>
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<td>DISABLE_PSI_COND</td>
<td>Exclude Performance Schema condition instrumentation</td>
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<td>Exclude the performance schema data lock instrumentation</td>
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<td>DISABLE_PSI_ERROR</td>
<td>Exclude the performance schema server error instrumentation</td>
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<tr>
<td>DISABLE_PSI_FILE</td>
<td>Exclude Performance Schema file instrumentation</td>
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<td>Exclude Performance Schema idle instrumentation</td>
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<td>DISABLE_PSI_MEMORY</td>
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<tr>
<td>DISABLE_PSI_METADATA</td>
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<td>Exclude Performance Schema stored program instrumentation</td>
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<td>Formats</td>
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<td></td>
</tr>
<tr>
<td>DISABLE_PSI_THREAD</td>
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<td></td>
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<td>DISABLE_PSI_TRANSACTION</td>
<td>Exclude the performance schema transaction instrumentation</td>
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<td>DISABLE_SHARED</td>
<td>Do not build shared libraries, compile position-dependent code</td>
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<td>DOWNLOAD_boost</td>
<td>Whether to download the Boost library</td>
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<td>DOWNLOAD(boost_timeout)</td>
<td>Timeout in seconds for downloading the Boost library</td>
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<td>Whether to enable query profiling code</td>
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<td>Whether to download optional files</td>
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<td>ENABLE_EXPERIMENTAL_SYSVAR</td>
<td>Whether to enabled experimental InnoDB system variables</td>
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<td>ENABLE_GCOV</td>
<td>Whether to include gcov support</td>
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<td>ENABLE_GPROF</td>
<td>Enable gprof (optimized Linux builds only)</td>
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<td>With -DBUILD_CONFIG=mysql_release, ignore libaio check</td>
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<td>Documentation directory</td>
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<td>README file directory</td>
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<td>Select predefined installation layout</td>
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<td>secure_file_priv default value</td>
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<td>INSTALL_SUPPORTFILESDIR</td>
<td>Extra support files directory</td>
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<td>Unix socket file used by X Plugin</td>
<td>/tmp/mysqlx.sock</td>
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<td>MYSQL_DATADIR</td>
<td>Data directory</td>
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<td>MYSQL_MAINTAINER_MODE</td>
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<td>Windows/macOS project name</td>
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<td>MYSQL_UNIX_ADDR</td>
<td>Unix socket file</td>
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<td>NDB_UTILS_LINK_DYNAMIC</td>
<td>Cause NDB tools to be dynamically linked to ndbclient</td>
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<td>OPTIMIZER_TRACE</td>
<td>Whether to support optimizer tracing</td>
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<td>SYSTEMD_SERVICE_NAME</td>
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<td>WIN_DEBUG_NO_INLINE</td>
<td>Whether to disable function inlining</td>
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<td>WITHOUT_xxx_STORAGE_ENGINE</td>
<td>Exclude storage engine xxx from build</td>
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<td>WITH_ANT</td>
<td>Path to Ant for building GCS Java wrapper</td>
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<td>WITH_ASAN</td>
<td>Enable AddressSanitizer</td>
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<td>WITH_ASAN_SCOPE</td>
<td>Enable AddressSanitizer - fsanitize-address-use-after-scope Clang flag</td>
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<td>Enable automatically if any corresponding server authentication plugins are built</td>
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<td>Whether to report error if LDAP authentication plugins cannot be built</td>
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<td>Build PAM authentication plugin</td>
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<td>WITH_AWS_SDK</td>
<td>Location of Amazon Web Services software development kit</td>
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## Formats

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<td>Build client-side protocol tracing framework</td>
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<td>WITH_CURL</td>
<td>Location of curl library</td>
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<td>WITH_DEBUG</td>
<td>Whether to include debugging support</td>
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<td>WITH_DEFAULT_COMPILER_OPTIONS</td>
<td>Whether to use default compiler options</td>
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<td>WITH_DEFAULT_FEATURE_SET</td>
<td>Whether to use default feature set</td>
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<td>Which libedit/editline library to use</td>
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<td>WITH_GMOCK</td>
<td>Path to googlemock distribution</td>
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<td>WITH_ICU</td>
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<td>WITH_INNODB_EXTRA_DEBUG</td>
<td>Whether to include extra debugging support for InnoDB.</td>
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<td>Whether to generate memcached shared libraries.</td>
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<td>WITH_JEMALLOC</td>
<td>Whether to link with -ljemalloc</td>
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<td>Build the keyring test program</td>
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<td>WITH_LIBEVENT</td>
<td>Which libevent library to use</td>
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<td>WITH_LIBWRAP</td>
<td>Whether to include libwrap (TCP wrappers) support</td>
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<td>WITH_LOCK_ORDER</td>
<td>Whether to enable LOCK_ORDER tooling</td>
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<td>Whether to run LeakSanitizer, without AddressSanitizer</td>
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<td>Enable MemorySanitizer</td>
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<td>Enable Visual Studio CRT memory leak tracing</td>
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<td>Whether to disable X Protocol</td>
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<td>Set NUMA memory allocation policy</td>
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<td>Which Protocol Buffers package to use</td>
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<td>WITH_RAPID</td>
<td>Whether to build rapid development cycle plugins</td>
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<td>Type of RapidJSON support</td>
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<td>Enable installation of systemd support files</td>
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<td>Enable additional systemd debug information</td>
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<td>Build test protocol trace plugin</td>
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<td>Enable ThreadSanitizer</td>
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<td>WITH_UBSAN</td>
<td>Enable Undefined Behavior Sanitizer</td>
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<td>Compile MySQL with unit tests</td>
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<td>Enable unixODBC support</td>
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<td>Whether to compile in Valgrind header files</td>
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<td>WITH_xxx_STORAGE_ENGINE</td>
<td>Compile storage engine xxx statically into server</td>
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</table>

### 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.

- **-DBUNDLE_RUNTIME_LIBRARIES=bool**

  Whether to bundle runtime libraries with server MSI and Zip packages for Windows.

- **-DCMAKE_BUILD_TYPE=type**

  The type of build to produce:

  - **RelWithDebInfo**: Enable optimizations and generate debugging information. This is the default MySQL build type.
  - **Release**: Enable optimizations but omit debugging information to reduce the build size. This build type was added in MySQL 8.0.13.
  - **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.

- `-DFORCE_INSOURCE_BUILD=bool`

Defines whether to force an in-source build. Out-of-source builds are recommended, as they permit multiple builds from the same source, and cleanup can be performed quickly by removing the build directory. To force an in-source build, invoke `CMake` with `-DFORCE_INSOURCE_BUILD=ON`.

### 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:

  ```
  cmake . -DINSTALL_LAYOUT=SVR4 -DMYSQL_DATADIR=/var/mysql/data
  ```
The INSTALL_LAYOUT value determines the default value of the secure_file_priv, keyring_encrypted_file_data, and keyring_file_data system variables. See the descriptions of those variables in Server System Variables, and Keyring System Variables.

- **-DINSTALL_LIBDIR=dir_name**
  Where to install library files.

- **-DINSTALL_MANDIR=dir_name**
  Where to install manual pages.

- **-DINSTALL_MYSQLKEYRINGDIR=dir_path**
  The default directory to use as the location of the keyring_file plugin data file. The default value is platform specific and depends on the value of the INSTALL_LAYOUT CMake option; see the description of the keyring_file_data system variable in Server System Variables.

- **-DINSTALL_MYSQLSHARDDR=dir_name**
  Where to install shared data files.

- **-DINSTALL_MYSQLTESTDIR=dir_name**
  Where to install the mysql-test directory. To suppress installation of this directory, explicitly set the option to the empty value (-DINSTALL_MYSQLTESTDIR=).

- **-DINSTALL_PKGCONFIGDIR=dir_name**
  The directory in which to install the mysqlclient.pc file for use by pkg-config. The default value is INSTALL_LIBDIR/pkgconfig, unless INSTALL_LIBDIR ends with /mysql, in which case that is removed first.

- **-DINSTALL_PLUGINDIR=dir_name**
  The location of the plugin directory.
  This value can be set at server startup with the --plugin_dir option.

- **-DINSTALL_PRIV_LIBDIR=dir_name**
  The location of the dynamic library directory.
  Default locations: RPM = /usr/lib64/mysql/private/, DEB = /usr/lib/mysql/private/, and TAR = lib/private/.

  This option was added in MySQL 8.0.18.

  For Protobuf: Because this is a private location, loader (such as ld-linux.so on Linux) may not find the libprotobuf.so files without help. To guide loader, RPATH with value $ORIGIN/.$INSTALL_PRIV_LIBDIR is added to mysqld and mysqlxtest. This works for most cases but when using the Resource Group feature, mysqld is setsuid and then loader ignores RPATH which contains $ORIGIN. To overcome this, an explicit full path to the directory is set in DEB and RPM variants of mysqld, as the target destination is known. For tarball installs, patching of mysqld with a tool like patchelf is required.

- **-DINSTALL_SBINDIR=dir_name**
  Where to install the mysqld server.
Installation Layout Options

• \texttt{-DINSTALL\_SECURE\_FILE\_PRIVDIR=dir\_name}
  
The default value for the \texttt{secure\_file\_priv} system variable. The default value is platform specific and depends on the value of the \texttt{INSTALL\_LAYOUT CMak}e option; see the description of the \texttt{secure\_file\_priv} system variable in Server System Variables.

• \texttt{-DINSTALL\_SHAREDIR=dir\_name}
  
  Where to install \texttt{aclocal/mysql.m4}.

• \texttt{-DINSTALL\_STATIC\_LIBRARIES=bool}
  
  Whether to install static libraries. The default is \texttt{ON}. If set to \texttt{OFF}, these libraries are not installed: \texttt{libmysqlclient.a, libmysqlservices.a}.

• \texttt{-DINSTALL\_SUPPORTFILESDIR=dir\_name}
  
  Where to install extra support files.

• \texttt{-DLINK\_RANDOMIZE=bool}
  
  Whether to randomize the order of symbols in the \texttt{mysqld} binary. The default is \texttt{OFF}. This option should be enabled only for debugging purposes.

• \texttt{-DLINK\_RANDOMIZE\_SEED=val}
  
  Seed value for the \texttt{LINK\_RANDOMIZE} option. The value is a string. The default is \texttt{mysql}, an arbitrary choice.

• \texttt{-DMYSQL\_DATADIR=dir\_name}
  
  The location of the MySQL data directory.
  
  This value can be set at server startup with the \texttt{--datadir} option.

• \texttt{-DODBC\_INCLUDES=dir\_name}
  
  The location of the ODBC includes directory, and may be used while configuring Connector/ODBC.

• \texttt{-DODBC\_LIB\_DIR=dir\_name}
  
  The location of the ODBC library directory, and may be used while configuring Connector/ODBC.

• \texttt{-DSYSCONFDIR=dir\_name}
  
  The default \texttt{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 \texttt{--defaults-file=file\_name} option, where \texttt{file\_name} is the full path name to the file.

• \texttt{-DSYSTEMD\_PID\_DIR=dir\_name}
  
  The name of the directory in which to create the PID file when MySQL is managed by systemd. The default is \texttt{/var/run/mysqld}; this might be changed implicitly according to the \texttt{INSTALL\_LAYOUT} value.
  
  This option is ignored unless \texttt{WITH\_SYSTEMD} is enabled.

• \texttt{-DSYSTEMD\_SERVICE\_NAME=name}
  
  The name of the MySQL service to use when MySQL is managed by systemd. The default is \texttt{mysqld}; this might be changed implicitly according to the \texttt{INSTALL\_LAYOUT} value.
Storage Engine Options

This option is ignored unless WITH_SYSTEMD is enabled.

- DTMPDIR=dir_name

The default location to use for the tmpdir system variable. If unspecified, the value defaults to P_tmpdir in <stdio.h>.

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 InnoDB, 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, and NDB or NDBCLUSTER (NDB support). Examples:

- DWITH_ARCHIVE_STORAGE_ENGINE=1
- DWITH_BLACKHOLE_STORAGE_ENGINE=1

Note

It is not possible to compile without Performance Schema support. If it is desired to compile without particular types of instrumentation, that can be done with the following CMake options:

DISABLE_PSI_COND
DISABLE_PSI_DATA_LOCK
DISABLE_PSI_ERROR
DISABLE_PSI_FILE
DISABLE_PSI_IDELE
DISABLE_PSI_MEMORY
DISABLE_PSI_METADATA
DISABLE_PSI_MUTEX
DISABLE_PSI_PS
DISABLE_PSI_rwlock
DISABLE_PSI_SOCKET
DISABLE_PSI_SP
DISABLE_PSI_STAGE
DISABLE_PSI_STATEMENT
DISABLE_PSI_STATEMENT_DIGEST
DISABLE_PSI_TABLE
DISABLE_PSI_THREAD
DISABLE_PSI_TRANSACTION

For example, to compile without mutex instrumentation, configure MySQL using the -DDISABLE_PSI_MUTEX=1 option.

To exclude a storage engine from the build, use -DWITH_engine_STORAGE_ENGINE=0. Examples:

- DWITH_ARCHIVE_STORAGE_ENGINE=0
- DWITH_EXAMPLE_STORAGE_ENGINE=0
- DWITH_FEDERATED_STORAGE_ENGINE=0

It is also possible to exclude a storage engine from the build using -DWITHOUT_engine_STORAGE_ENGINE=1 (but -DWITH_engine_STORAGE_ENGINE=0 is preferred). Examples:

- DWITHOUT_ARCHIVE_STORAGE_ENGINE=1
- DWITHOUT_EXAMPLE_STORAGE_ENGINE=1
- DWITHOUT_FEDERATED_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

- `-DADD_GDB_INDEX=bool`

  This option determines whether to enable generation of a .gdb_index section in binaries, which makes loading them in a debugger faster. The option is disabled by default. ld linker is used, and is disabled by it has no effect if a linker other than ld or GNU gold is used.

  This option was added in MySQL 8.0.18.

- `-DCOMPILATION_COMMENT=string`

  A descriptive comment about the compilation environment. As of MySQL 8.0.14, mysqlld uses COMPILATION_COMMENT_SERVER. Other programs continue to use COMPILATION_COMMENT.

- `-DCOMPRESS_DEBUG_SECTIONS=bool`

  Whether to compress the debug sections of binary executables (Linux only). Compressing executable debug sections saves space at the cost of extra CPU time during the build process.

  The default is OFF. If this option is not set explicitly but the COMPRESS_DEBUG SECTIONS environment variable is set, the option takes its value from that variable.

  This option was added in MySQL 8.0.22.

- `-DCOMPILATIONCOMMENTSERVER=string`

  A descriptive comment about the compilation environment for use by mysqld (for example, to set the version_comment system variable). This option was added in MySQL 8.0.14. Prior to 8.0.14, the server uses COMPILATIONCOMMENT.

- `-DDDEFAULT_CHARSET=charset_name`

  The server character set. By default, MySQL uses the utf8mb4 character set.

  charset_name may be one of binary, armSCII8, ascii, big5, cp1250, cp1251, cp1256, cp1257, cp850, cp852, cp866, cp932, dec8, eucjpms, euckr, gb2312, gb8k, geostd8, greek, hebrew, hp6, keybcs2, koi8r, koi8u, latin1, latin2, latin5, latin7, macce, macroman, sjis, swe7, tis620, ucs2, ujis, utf8, utf8mb4, utf16, utf16le, 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.

- `-DDDEFAULT_COLLATION=collation_name`

  The server collation. By default, MySQL uses utf8mb4_0900_ai_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.

- `-DDDISABLE_PSI_COND=bool`

  Whether to exclude the Performance Schema condition instrumentation. The default is OFF (include).

- `-DDDISABLE_PSI_FILE=bool`

  Whether to exclude the Performance Schema file instrumentation. The default is OFF (include).
Feature Options

- **-DDISABLE_PSI_IDLE=bool**
  Whether to exclude the Performance Schema idle instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_MEMORY=bool**
  Whether to exclude the Performance Schema memory instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_METADATA=bool**
  Whether to exclude the Performance Schema metadata instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_MUTEX=bool**
  Whether to exclude the Performance Schema mutex instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_RWLOCK=bool**
  Whether to exclude the Performance Schema rwlock instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_SOCKET=bool**
  Whether to exclude the Performance Schema socket instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_SP=bool**
  Whether to exclude the Performance Schema stored program instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_STAGE=bool**
  Whether to exclude the Performance Schema stage instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_STATEMENT=bool**
  Whether to exclude the Performance Schema statement instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_STATEMENT_DIGEST=bool**
  Whether to exclude the Performance Schema statement_digest instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_TABLE=bool**
  Whether to exclude the Performance Schema table instrumentation. The default is OFF (include).

- **-DDISABLE_SHARED=bool**
  Whether to disable building build shared libraries and compile position-dependent code. The default is OFF (compile position-independent code).

  This option is unused and was removed in MySQL 8.0.18.

- **-DDISABLE_PSI_PS=bool**
  Exclude the performance schema prepared statements instances instrumentation. The default is OFF (include).

- **-DDISABLE_PSI_THREAD=bool**
  Exclude the performance schema thread instrumentation. The default is OFF (include).
Only disable threads when building without any instrumentation, because other instrumentations have a dependency on threads.

- **DISABLE_PSI_TRANSACTION=bool**

Exclude the performance schema transaction instrumentation. The default is **OFF** (include).

- **DISABLE_PSI_DATA_LOCK=bool**

Exclude the performance schema data lock instrumentation. The default is **OFF** (include).

- **DISABLE_PSI_ERROR=bool**

Exclude the performance schema server error instrumentation. The default is **OFF** (include).

- **DOWNLOAD_BOOST=bool**

Whether to download the Boost library. The default is **OFF**.

See the **WITH_BOOST** option for additional discussion about using Boost.

- **DOWNLOAD_BOOST_TIMEOUT=seconds**

The timeout in seconds for downloading the Boost library. The default is 600 seconds.

See the **WITH_BOOST** option for additional discussion about using Boost.

- **ENABLE_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, or Ant and JUnit required for building GCS Java wrapper.

As of MySQL 8.0.26, MySQL source distributions bundle the Google Test source code, used to run Google Test-based unit tests. Consequently, as of that version the **WITH_GMOCK** and **ENABLE_DOWNLOADS** **CMake** options are removed and are ignored if specified.

- **ENABLE_EXPERIMENTAL_SYSVARS=bool**

Whether to enable experimental InnoDB system variables. Experimental system variables are intended for those engaged in MySQL development, should only be used in a development or test environment, and may be removed without notice in a future MySQL release. For information about experimental system variables, refer to `/storage/innobase/handler/ha_innodb.cc` in the MySQL source tree. Experimental system variables can be identified by searching for “PLUGIN_VAR_EXPERIMENTAL”.

- **ENABLE_GCOV=bool**

Whether to include gcov support (Linux only).

- **ENABLE_GPROF=bool**

Whether to enable gprof (optimized Linux builds only).

- **ENABLED_LOCAL_INFILE=bool**

This option controls the compiled-in default LOCAL capability for the MySQL client library. Clients that make no explicit arrangements therefore have LOCAL capability disabled or enabled according to the **ENABLED_LOCAL_INFILE** setting specified at MySQL build time.

By default, the client library in MySQL binary distributions is compiled with **ENABLED_LOCAL_INFILE** disabled. If you compile MySQL from source, configure it with
**ENABLED_LOCAL_INFILE** disabled or enabled based on whether clients that make no explicit arrangements should have **LOCAL** capability disabled or enabled, respectively.

**ENABLED_LOCAL_INFILE** controls the default for client-side **LOCAL** capability. For the server, the **local_infile** system variable controls server-side **LOCAL** capability. To explicitly cause the server to refuse or permit **LOAD DATA LOCAL** statements (regardless of how client programs and libraries are configured at build time or runtime), start **mysqld** with **local_infile** disabled or enabled, respectively. **local_infile** can also be set at runtime. See Security Considerations for **LOAD DATA LOCAL**.

- **-DENABLED_PROFILING=bool**
  Whether to enable query profiling code (for the **SHOW PROFILE** and **SHOW PROFILES** statements).

- **-DFORCE_UNSUPPORTED_COMPILER=bool**
  By default, **CMake** checks for minimum versions of supported compilers: Visual Studio 2015 (Windows); GCC 4.8 or Clang 3.4 (Linux); Developer Studio 12.5 (Solaris server); Developer Studio 12.4 or GCC 4.8 (Solaris client library); Clang 3.6 (macOS), Clang 3.4 (FreeBSD). To disable this check, use **-DFORCE_UNSUPPORTED_COMPILER=ON**.

- **-DFPROFILE_GENERATE=bool**
  Whether to generate profile guided optimization (PGO) data. This option is available for experimenting with PGO with GCC. See the **cmake/fprofile.cmake** file in a MySQL source distribution for information about using **PROFILE_GENERATE** and **PROFILE_USE**. These options have been tested with GCC 8 and 9.

  This option was added in MySQL 8.0.19.

- **-DFPROFILE_USE=bool**
  Whether to use profile guided optimization (PGO) data. This option is available for experimenting with PGO with GCC. See the **cmake/fprofile.cmake** file in a MySQL source distribution for information about using **PROFILE_GENERATE** and **PROFILE_USE**. These options have been tested with GCC 8 and 9.

  Enabling **PROFILE_USE** also enables **WITH_LTO**.

  This option was added in MySQL 8.0.19.

- **-DHAVE_PSI_MEMORY_INTERFACE=bool**
  Whether to enable the performance schema memory tracing module for memory allocation functions (**ut::aligned_name** library functions) used in dynamic storage of over-aligned types.

- **-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**.

- **-DMAX_INDEXES=num**
  The maximum number of indexes per table. The default is 64. The maximum is 255. Values smaller than 64 are ignored and the default of 64 is used.

- **-DMYSQL_MAINTAINER_MODE=bool**
  Whether to enable a MySQL maintainer-specific development environment. If enabled, this option causes compiler warnings to become errors.
Feature Options

• `-DMUTEX_TYPE=type`

The mutex type used by InnoDB. Options include:

• `event`: Use event mutexes. This is the default value and the original InnoDB mutex implementation.

• `sys`: Use POSIX mutexes on UNIX systems. Use CRITICAL_SECTION objects on Windows, if available.

• `futex`: Use Linux futexes instead of condition variables to schedule waiting threads.

• `-DMYSQLX_TCP_PORT=port_num`

The port number on which X Plugin listens for TCP/IP connections. The default is 33060.

This value can be set at server startup with the `mysqlx_port` system variable.

• `-DMYSQLX_UNIX_ADDR=file_name`

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

This value can be set at server startup with the `mysqlx_port` system variable.

• `-DMYSQL_PROJECT_NAME=name`

For Windows or macOS, the project name to incorporate into the project file name.

• `-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.

• `-DOPTIMIZER_TRACE=bool`

Whether to support optimizer tracing. See MySQL Internals: Tracing the Optimizer.

• `-DREPRODUCIBLE_BUILD=bool`

For builds on Linux systems, this option controls whether to take extra care to create a build result independent of build location and time.

This option was added in MySQL 8.0.11. As of MySQL 8.0.12, it defaults to `ON` for RelWithDebInfo builds.

• `-DUSE_LD_GOLD=bool`

CMake causes the build process to link with the GNU gold linker if it is available and not explicitly disabled. To disable use of this linker, specify the `-DUSE_LD_GOLD=OFF` option.

• `-DUSE_LD_LLD=bool`

CMake causes the build process to link with the llvm lld linker for Clang if it is available and not explicitly disabled. To disable use of this linker, specify the `-DUSE_LD_LLD=OFF` option.
Feature Options

This option was added in MySQL 8.0.16.

- `DWIN_DEBUG_NO_INLINE=bool`

Whether to disable function inlining on Windows. The default is off (inlining enabled).

- `WITH_ANT=path_name`

Set the path to Ant, required when building GCS Java wrapper. Works in a similar way to the existing `WITH_BOOST` CMake option. Set `WITH_ANT` to the path of a directory where the Ant tarball, or an already unpacked archive, is saved. When `WITH_ANT` is not set, or is set with the special value `system`, the build assumes a binary `ant` exists in `$PATH`.

- `WITH_ASAN=bool`

Whether to enable the AddressSanitizer, for compilers that support it. The default is off.

- `WITH_ASAN_SCOPE=bool`

Whether to enable the AddressSanitizer `-fsanitize-address-use-after-scope` Clang flag for use-after-scope detection. The default is off. To use this option, `WITH_ASAN` must also be enabled.

- `WITH_AUTHENTICATION_CLIENT_PLUGINS=bool`

This option is enabled automatically if any corresponding server authentication plugins are built. Its value thus depends on other CMake options and it should not be set explicitly.

This option was added in MySQL 8.0.26.

- `WITH_AUTHENTICATION_LDAP=bool`

Whether to report an error if the LDAP authentication plugins cannot be built:

- If this option is disabled (the default), the LDAP plugins are built if the required header files and libraries are found. If they are not, CMake displays a note about it.

- If this option is enabled, a failure to find the required header file and libraries causes CMake to produce an error, preventing the server from being built.

- `WITH_AUTHENTICATION_PAM=bool`

Whether to build the PAM authentication plugin, for source trees that include this plugin. (See PAM Pluggable Authentication.) If this option is specified and the plugin cannot be compiled, the build fails.

- `WITH_AWS_SDK=path_name`

The location of the Amazon Web Services software development kit.
Feature Options

- **-DWITH_BOOST=path_name**

  The Boost library is required to build MySQL. These CMake options enable control over the library source location, and whether to download it automatically:

  - **-DWITH_BOOST=path_name** specifies the Boost library directory location. It is also possible to specify the Boost location by setting the `BOOST_ROOT` or `WITH_BOOST` environment variable.

  - **-DWITH_BOOST=system** is also permitted and indicates that the correct version of Boost is installed on the compilation host in the standard location. In this case, the installed version of Boost is used rather than any version included with a MySQL source distribution.

  - **-DDOWNLOAD_BOOST=bool** specifies whether to download the Boost source if it is not present in the specified location. The default is OFF.

  - **-DDOWNLOAD_BOOST_TIMEOUT=seconds** the timeout in seconds for downloading the Boost library. The default is 600 seconds.

  For example, if you normally build MySQL placing the object output in the `bld` subdirectory of your MySQL source tree, you can build with Boost like this:

  ```
  mkdir bld
  cd bld
  cmake .. -DDOWNLOAD_BOOST=ON -DWITH_BOOST=$HOME/my_boost
  ```

  This causes Boost to be downloaded into the `my_boost` directory under your home directory. If the required Boost version is already there, no download is done. If the required Boost version changes, the newer version is downloaded.

  If Boost is already installed locally and your compiler finds the Boost header files on its own, it may not be necessary to specify the preceding CMake options. However, if the version of Boost required by MySQL changes and the locally installed version has not been upgraded, you may have build problems. Using the CMake options should give you a successful build.

  With the above settings that allow Boost download into a specified location, when the required Boost version changes, you need to remove the `bld` folder, recreate it, and perform the `cmake` step again. Otherwise, the new Boost version might not get downloaded, and compilation might fail.

- **-DWITH_CLIENT_PROTOCOL_TRACING=bool**

  Whether to build the client-side protocol tracing framework into the client library. By default, this option is enabled.

  For information about writing protocol trace client plugins, see Writing Protocol Trace Plugins.

  See also the `WITH_TEST_TRACE_PLUGIN` option.

- **-DWITH_CURL(curl_type)**

  The location of the curl library. `curl_type` can be system (use the system curl library) or a path name to the curl library.

- **-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
Feature Options

statements to dump a parser trace to the server’s standard error output. Typically, this output is
written to the error log.

Sync debug checking for the InnoDB storage engine is defined under `UNIV_DEBUG` and is available
when debugging support is compiled in using the `WITH_DEBUG` option. When debugging support
is compiled in, the `innodb_sync_debug` configuration option can be used to enable or disable
InnoDB sync debug checking.

Enabling `WITH_DEBUG` also enables Debug Sync. This facility is used for testing and debugging.
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.

Sync debug checking for the InnoDB storage engine is available when debugging support is
compiled in using the `WITH_DEBUG` option.

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

- `-DWITH_DEFAULT_FEATURE_SET=bool`
  Whether to use the flags from `cmake/build_configurations/feature_set.cmake`. This
  option was removed in MySQL 8.0.22.

- `-DWITH_EDITLINE=value`
  Which `libedit/editline` library to use. The permitted values are `bundled` (the default) and
  `system`.

- `-DWITH_GMOCK=path_name`
  The path to the googlemock distribution, for use with Google Test-based unit tests. The option value
  is the path to the distribution Zip file. Alternatively, set the `WITH_GMOCK` environment variable to
  the path name. It is also possible to use `-DENABLE_DOWNLOADS=1`, so that CMake downloads the
  distribution from GitHub.

  If you build MySQL without the Google Test-based unit tests (by configuring without `WITH_GMOCK`),
  CMake displays a message indicating how to download it.

  As of MySQL 8.0.26, MySQL source distributions bundle the Google Test source code, used
to run Google Test-based unit tests. Consequently, as of that version the `WITH_GMOCK` and
`ENABLE_DOWNLOADS` CMake options are removed and are ignored if specified.

- `-DWITH_ICU={icu_type|path_name}`
  MySQL uses International Components for Unicode (ICU) to support regular expression operations.
The `WITH_ICU` option indicates the type of ICU support to include or the path name to the ICU
installation to use.

  - `icu_type` can be one of the following values:
    - `bundled`: Use the ICU library bundled with the distribution. This is the default, and is the only
      supported option for Windows.
    - `system`: Use the system ICU library.
    - `path_name` is the path name to the ICU installation to use. This can be preferable to using the
      `icu_type` value of `system` because it can prevent CMake from detecting and using an older or
      incorrect ICU version installed on the system. (Another permitted way to do the same thing is to
      set `WITH_ICU` to `system` and set the `CMAKE_PREFIX_PATH` option to `path_name`.)

- `-DWITH_INNODB_EXTRA_DEBUG=bool`
Whether to include extra InnoDB debugging support.

Enabling `WITH_INNODB_EXTRA_DEBUG` turns on extra InnoDB debug checks. This option can only be enabled when `WITH_DEBUG` is enabled.

- `--WITH_INNODB_MEMCACHED=bool`

Whether to generate memcached shared libraries (`libmemcached.so` and `innodb_engine.so`).

- `--WITH_JEMALLOC=bool`

Whether to link with `-ljemalloc`. If enabled, built-in `malloc()`, `calloc()`, `realloc()`, and `free()` routines are disabled. The default is `OFF`. `WITH_JEMALLOC` and `WITH_TCMALLOC` are mutually exclusive.

This option was added in MySQL 8.0.16.

- `--WITH_KEYRING_TEST=bool`

Whether to build the test program that accompanies the `keyring_file` plugin. The default is `OFF`. Test file source code is located in the `plugin/keyring/keyring-test` directory.

- `--WITH_LIBEVENT=string`

Which `libevent` library to use. Permitted values are `bundled` (default) and `system`. Prior to MySQL 8.0.21, if you specify `system`, the system `libevent` library is used if present, and an error occurs otherwise. In MySQL 8.0.21 and later, if `system` is specified and no system `libevent` library can be found, an error occurs regardless, and the bundled `libevent` is not used.

The `libevent` library is required by InnoDB memcached, X Plugin, and MySQL Router.

- `--WITH_LIBWRAP=bool`

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

- `--WITH_LOCK_ORDER=bool`

Whether to enable LOCK_ORDER tooling. By default, this option is disabled and server builds contain no tooling. If tooling is enabled, the LOCK_ORDER tool is available and can be used as described in The LOCK_ORDER Tool.

  **Note**

  With the `WITH_LOCK_ORDER` option enabled, MySQL builds require the `flex` program.

  This option was added in MySQL 8.0.17.

- `--WITH_LSAN=bool`

Whether to run LeakSanitizer, without AddressSanitizer. The default is `OFF`.

This option was added in MySQL 8.0.16.

- `--WITH_LTO=bool`

Whether to enable the link-time optimizer, if the compiler supports it. The default is `OFF` unless `FPROFILE_USE` is enabled.

This option was added in MySQL 8.0.13.

- `--WITH_LZ4=lz4_type`
The `WITH_LZ4` indicates the source of `zlib` support:

- **bundled**: Use the `lz4` library bundled with the distribution. This is the default.
- **system**: Use the system `lz4` library. If `WITH_LZ4` is set to this value, the `lz4_decompress` utility is not built. In this case, the system `lz4` command can be used instead.

- `-DWITH_LZMA=lxma_type`

The type of LZMA library support to include. `lxma_type` can be one of the following values:

- **bundled**: Use the LZMA library bundled with the distribution. This is the default.
- **system**: Use the system LZMA library.

This option was removed in MySQL 8.0.16.

- `-DWITH_MECAB={disabled|system|path_name}`

Use this option to compile the MeCab parser. If you have installed MeCab to its default installation directory, set `-DWITH_MECAB=system`. The `system` option applies to MeCab installations performed from source or from binaries using a native package management utility. If you installed MeCab to a custom installation directory, specify the path to the MeCab installation. For example, `-DWITH_MECAB=/opt/mecab`. If the `system` option does not work, specifying the MeCab installation path should work in all cases.

For related information, see [MeCab Full-Text Parser Plugin](#).

- `-DWITH_MSAN=bool`

Whether to enable MemorySanitizer, for compilers that support it. The default is off.

For this option to have an effect if enabled, all libraries linked to MySQL must also have been compiled with the option enabled.

- `-DWITH_MSCRT_DEBUG=bool`

Whether to enable Visual Studio CRT memory leak tracing. The default is `OFF`.

- `-DWITH_MYSQLX=bool`

Whether to build with support for X Plugin. Default `ON`. See [Using MySQL as a Document Store](#).

- `-DWITH_NUMA=bool`

Explicitly set the NUMA memory allocation policy. CMake sets the default `WITH_NUMA` value based on whether the current platform has NUMA support. For platforms without NUMA support, CMake behaves as follows:

- With no NUMA option (the normal case), CMake continues normally, producing only this warning: NUMA library missing or required version not available
- With `-DWITH_NUMA=ON`, CMake aborts with this error: NUMA library missing or required version not available
Feature Options

• `-DWITH_PROTOBUF=protobuf_type`

Which Protocol Buffers package to use. `protobuf_type` can be one of the following values:

• `bundled`: Use the package bundled with the distribution. This is the default. Optionally use `INSTALL_PRIV_LIBDIR` to modify the dynamic Protobuf library directory.

• `system`: Use the package installed on the system.

Other values are ignored, with a fallback to `bundled`.

• `-DWITH_RAPID=bool`

Whether to build the rapid development cycle plugins. When enabled, a `rapid` directory is created in the build tree containing these plugins. When disabled, no `rapid` directory is created in the build tree. The default is `ON`, unless the `rapid` directory is removed from the source tree, in which case the default becomes `OFF`.

• `-DWITH_RAPIDJSON=rapidjson_type`

The type of RapidJSON library support to include. `rapidjson_type` can be one of the following values:

• `bundled`: Use the RapidJSON library bundled with the distribution. This is the default.

• `system`: Use the system RapidJSON library. Version 1.1.0 or higher is required.

This option was added in MySQL 8.0.13.

• `-DWITH_RE2=re2_type`

The type of RE2 library support to include. `re2_type` can be one of the following values:

• `bundled`: Use the RE2 library bundled with the distribution. This is the default.

• `system`: Use the system RE2 library.

As of MySQL 8.0.18, MySQL no longer uses the RE2 library and this option was removed.

• `-DWITH_ROUTER=bool`

Whether to build MySQL Router. The default is `ON`.

This option was added in MySQL 8.0.16.

• `-DWITH_SSL={ssl_type|path_name}`

For support of encrypted connections, entropy for random number generation, and other encryption-related operations, MySQL must be built using an SSL library. This option specifies which SSL library to use.

• `ssl_type` can be one of the following values:

• `system`: Use the system OpenSSL library. This is the default.

  On macOS and Windows, using `system` configures MySQL to build as if CMake was invoked with `path_name` points to a manually installed OpenSSL library. This is because they do not have system SSL libraries. On macOS, `brew install openssl` installs to `/usr/local/opt/openssl`, so that `system` can find it. On Windows, it checks `%ProgramFiles%\OpenSSL`, `%ProgramFiles%\OpenSSL-Win32`, `%ProgramFiles%\OpenSSL-Win64`, `C:\OpenSSL`, `C:\OpenSSL-Win32`, and `C:\OpenSSL-Win64`.

• `yes`: This is a synonym for `system`.  


Feature Options

- **path_name** is the path name to the OpenSSL installation to use. This can be preferable to using the `ssl_type` value of `system` because it can prevent CMake from detecting and using an older or incorrect OpenSSL version installed on the system. (Another permitted way to do the same thing is to set `WITH_SSL` to `system` and set the `CMAKE_PREFIX_PATH` option to `path_name`.)

For additional information about configuring the SSL library, see Configuring SSL Library Support.

- **-DWITH_SYSTEMD=bool**

  Whether to enable installation of systemd support files. By default, this option is disabled. When enabled, systemd support files are installed, and scripts such as `mysqld_safe` and the System V initialization script are not installed. On platforms where systemd is not available, enabling `WITH_SYSTEMD` results in an error from CMake.

  For more information about using systemd, see Managing MySQL Server with systemd. That section also includes information about specifying options previously specified in `[mysqld_safe]` option groups. Because `mysqld_safe` is not installed when systemd is used, such options must be specified another way.

- **-DWITH_SYSTEM_LIBS=bool**

  This option serves as an "umbrella" option to set the `system` value of any of the following CMake options that are not set explicitly: `WITH_CURL`, `WITH_EDITLINE`, `WITH_ICU`, `WITH_LIBEV`, `WITH_LZ4`, `WITH_LZMA`, `WITH_PROTOBUF`, `WITH_RE2`, `WITH_SSL`, `WITH_ZLIB`, `WITH_ZSTD`.

- **-DWITH_SYSTEMD_DEBUG=bool**

  Whether to produce additional systemd debugging information, for platforms on which systemd is used to run MySQL. The default is OFF. This option was added in MySQL 8.0.22.

- **-DWITH_TCMALLOC=bool**

  Whether to link with `-ltcmalloc`. If enabled, built-in `malloc()`, `calloc()`, `realloc()`, and `free()` routines are disabled. The default is OFF.

  `WITH_TCMALLOC` and `WITH_JEMALLOC` are mutually exclusive.

  This option was added in MySQL 8.0.22.

- **-DWITH_TEST_TRACE_PLUGIN=bool**

  Whether to build the test protocol trace client plugin (see Using the Test Protocol Trace Plugin). By default, this option is disabled. Enabling this option has no effect unless the `WITH_CLIENT_PROTOCOL_TRACING` option is enabled. If MySQL is configured with both options enabled, the `libmysqlclient` client library is built with the test protocol trace plugin built in, and all the standard MySQL clients load the plugin. However, even when the test plugin is enabled, it has no effect by default. Control over the plugin is afforded using environment variables; see Using the Test Protocol Trace Plugin.

  **Note**

  Do not enable the `WITH_TEST_TRACE_PLUGIN` option if you want to use your own protocol trace plugins because only one such plugin can be loaded at a time and an error occurs for attempts to load a second one. If you have already built MySQL with the test protocol trace plugin enabled to see how it works, you must rebuild MySQL without it before you can use your own plugins.

  For information about writing trace plugins, see Writing Protocol Trace Plugins.
• -DWITH_TSAN=bool

Whether to enable the ThreadSanitizer, for compilers that support it. The default is off.

• -DWITH_UBSAN=bool

Whether to enable the Undefined Behavior Sanitizer, for compilers that support it. The default is off.

• -DWITH_UNIT_TESTS={ON|OFF}

If enabled, compile MySQL with unit tests. The default is ON unless the server is not being compiled.

• -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. If WITH_ZLIB is set to this value, the zlib_decompress utility is not built. In this case, the system openssl zlib command can be used instead.

• -DWITH_ZSTD=zstd_type

Connection compression using the zstd algorithm (see Connection Compression Control) requires that the server be built with zstd library support. The WITH_ZSTD indicates the source of zstd support:

• bundled: Use the zstd library bundled with the distribution. This is the default.

• system: Use the system zstd library.

This option was added in MySQL 8.0.18.

**Compiler Flags**

• -DCMAKE_C_FLAGS="flags"

Flags for the C Compiler.

• -DCMAKE_CXX_FLAGS="flags"

Flags for the C++ Compiler.

• -DWITH_DEFAULT_COMPILER_OPTIONS=bool

Whether to use the flags from cmake/build_configurations/compiler_options.cmake.
CMake Options for Compiling NDB Cluster

Note

All optimization flags were carefully chosen and tested by the MySQL build team. Overriding them can lead to unexpected results and is done at your own risk.

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:

```
mkdir bld
cd bld
make .. -DCMAKE_C_FLAGS=-m32 -DCMAKE_CXX_FLAGS=-m32 -DCMAKE_BUILD_TYPE=RelWithDebInfo
```

If you set flags that affect optimization (\(-O\)number\), 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:

```
make .. -DCMAKE_C_FLAGS_RELWITHDEBINFO=-O3 -g -DCMAKE_CXX_FLAGS_RELWITHDEBINFO=-O3 -g
```

CMake Options for Compiling NDB Cluster

The following options are for use when building MySQL 8.0 sources with NDB Cluster support.

- \(-DMEMCACHED_HOME=dir\_name\)

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.

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 NDB Cluster.

- \(-NDB_UTILS_LINK_DYNAMIC={ON|OFF}\)

Controls whether NDB utilities such as ndb\_drop\_table are linked with ndbclient statically (OFF) or dynamically (ON); OFF (static linking) is the default. Normally static linking is used when building these to avoid problems with LD\_LIBRARY\_PATH, or when multiple versions of ndbclient are installed. This option is intended for creating Docker images and possibly other cases in which the target environment is subject to precise control and it is desirable to reduce image size.

Added in NDB 8.0.22.

- \(-DWITH_BUNDLED_LIBEVENT={ON|OFF}\)
CMake Options for Compiling NDB Cluster

Use the `libevent` included in the NDB Cluster sources when building NDB Cluster with `ndbmemcached` support. 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 NDB Cluster source tree, then use the resulting memcached server when building the `ndbmemcached` engine. In this case, `make install` places the `memcached` binary in the installation `bin` directory, and the `ndbmemcached` 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 NDB Cluster Connector for Java. The default is empty. 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}**

  This is an alias for `WITH_NDBCLUSTER`.

- **-DWITH_NDBCLUSTER={ON|OFF}**

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

- **-DWITH_NDBMTD={ON|OFF}**

  Build the multithreaded 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 NDB Cluster binaries. OFF by default.

- **-DWITH_NDB_JAVA={ON|OFF}**

  Enable building NDB Cluster with Java support, including ClusterJ.

  This option is ON by default. If you do not wish to compile NDB 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 NDB 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.

- **-DWITH_PLUGIN_NDBCLUSTER={ON|OFF}**

  Alias for `WITH_NDBCLUSTER`.
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, 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 and --cxxflags options.

- 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:
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*. 