

MySQL Development Cycle

Abstract

This document explains the MySQL Server development cycle. The purpose of the document is to facilitate community involvement, for example by providing feedback on pre-releases and making contributions to upcoming releases, through explaining how MySQL Server versions are developed.

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.

Document generated on: 2023-12-22 (revision: 587)

Table of Contents

1 Preface and Legal Notices	1
2 Feature Development	3
3 Feature Testing	3
4 Performance Testing	4
5 Lab Releases	5
6 Development Milestone Releases	5
7 General Availability (GA) Releases	6

1 Preface and Legal Notices

This document explains the MySQL Server development cycle. The purpose of the document is to facilitate community involvement, for example by providing feedback on pre-releases and making contributions to upcoming releases, through explaining how MySQL Server versions are developed.

Legal Notices

Copyright © 2004, 2024, Oracle and/or its affiliates. All rights reserved.

License Restrictions

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

Warranty Disclaimer

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

Restricted Rights Notice

If this is software, software documentation, data (as defined in the Federal Acquisition Regulation), or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, then the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs) and Oracle computer documentation or other Oracle data delivered to or accessed by U.S. Government end users are "commercial computer software," "commercial computer software documentation," or "limited rights data" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, the use, reproduction, duplication, release, display, disclosure, modification, preparation of derivative works, and/or adaptation of i) Oracle programs (including any operating system, integrated software, any programs embedded, installed, or activated on delivered hardware, and modifications of such programs), ii) Oracle computer documentation and/or iii) other Oracle data, is subject to the rights and limitations specified in the license contained in the applicable contract. The terms governing the U.S. Government's use of Oracle cloud services are defined by the applicable contract for such services. No other rights are granted to the U.S. Government.

Hazardous Applications Notice

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

Trademark Notice

Oracle, Java, MySQL, and NetSuite are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Inside are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Epyc, and the AMD logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

Third-Party Content, Products, and Services Disclaimer

This software or hardware and documentation may provide access to or information about content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services unless otherwise set forth in an applicable agreement between you and Oracle. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services, except as set forth in an applicable agreement between you and Oracle.

Use of This Documentation

This documentation is NOT distributed under a GPL license. Use of this documentation is subject to the following terms:

You may create a printed copy of this documentation solely for your own personal use. Conversion to other formats is allowed as long as the actual content is not altered or edited in any way. You shall not publish or distribute this documentation in any form or on any media, except if you distribute the documentation in

a manner similar to how Oracle disseminates it (that is, electronically for download on a Web site with the software) or on a CD-ROM or similar medium, provided however that the documentation is disseminated together with the software on the same medium. Any other use, such as any dissemination of printed copies or use of this documentation, in whole or in part, in another publication, requires the prior written consent from an authorized representative of Oracle. Oracle and/or its affiliates reserve any and all rights to this documentation not expressly granted above.

2 Feature Development

Feature development happens as follows:

- A MySQL feature is specified in a Worklog entry.
- The Worklog entry undergoes specification, design, architecture and QA reviews (but not necessarily in a strict sequence).
- The MySQL feature is implemented in a **feature tree**.
- Feature trees are created from and kept in sync with the MySQL main development tree, which is called **TRUNK**.
- When a feature has been implemented, it undergoes a code review.
- When the code review is done, the feature tree is handed over to QA (quality assurance).
- QA tests the feature, the implementor fixes bugs, and QA eventually “signs off” the feature.
- Once the feature is signed off, it is merged into TRUNK.

This way, TRUNK will accumulate features and bug fixes over time. Extensive regression testing is performed on TRUNK all the time, keeping TRUNK close to Release Candidate (RC) quality at all times.

3 Feature Testing

New features in MySQL are developed and tested in separate feature trees before they are pushed to TRUNK. Quality goals for new features are the following:

- Complete functional and nonfunctional test coverage of changed and new functionality
- No regressions
- At least more than 80% code coverage

QA involvement starts as soon as the requirements and specifications of the feature are finalized by the development team. QA reviews available documents and provides feedback on the design, usability, testability, etc. A discussion follows with the developer and changes are made as needed to ensure that the feature can be tested.

Once the specifications and requirements are acceptable, QA creates the test plan which documents all scenarios that are to be tested. This includes standalone tests, integration tests, nonfunctional tests, etc. The test plan is reviewed by developers and peer QA team members.

While the developers are writing the product code, QA engineers start working on the automated tests, test infrastructure improvements, etc. The final round of testing starts after the feature has passed code

reviews. This phase can last anywhere between a few days to months, depending on the complexity of the feature, stability of the code, number of bugs found, etc.

Features get signed off when the following conditions are met:

- No known bugs in the new feature – This is very strictly enforced and even minor bugs are not allowed. We believe that bugs are easiest to fix when the code is new, and hence this can help us deliver features that are of high quality.
- No known regressions – A feature gets developed on a tree which gets tested regularly through a continuous integration testing tool. Any regressions are detected and fixed before signoff.
- Acceptable code coverage numbers – A code coverage report is generated for the changed lines of code and the minimum expected coverage is 80%. Most features have a coverage of more than 90%. Any uncovered lines of code are analyzed and, wherever possible, new tests are added to increase code coverage.
- All new tests are added to the automated regression suite.

4 Performance Testing

We execute performance testing to assure that the performance profile of the products does not regress. Performance testing is done all throughout the development process (in the current TRUNK branch), and focuses on throughput testing and response time testing.

Throughput Testing

The focus of throughput testing are high concurrency scenarios, with concurrent connections ranging from 8 to 1024. Testing is performed with open source applications like sysbench, with an emphasis on simple queries and simple OLTP transactions, but also including custom workloads. Other tests offer a much deeper look into complex OLTP throughput. These tests use short durations per test (5 to 10 minutes per test), varying server configuration options, and varying dataset sizes for both batched and atomic transaction types. The primary purpose of those tests is to expose bottlenecks, eliminate regressions, and benchmark the throughput. Results are archived in a database in order to facilitate retrieval for comparisons, and automated comparisons are performed to standardize evaluation.

Response Time Testing

Response time testing is done for single threads, because the main focus is to ensure consistency regarding query plan and execution time performance. An open source standardized test is used to improve and guard against regression in the parser or optimizer. We use two different configurations, one of them performing CPU-bound testing, and the other performing I/O-bound testing. Results are automatically compared with results from previous tests, and archived in a database. From those data, summaries and reports are created.

Apart from testing new features, all the above tests are performed in regular intervals (daily and weekly). These tests are run on Linux and Windows platforms. For interval testing, automation is used to pull the current code, execute testing, compare against previously established baselines, and report results. If any of the results exceed preset thresholds, this is tracked as a failure, and prompts further investigation. That research may reveal that the failure is due to recently introduced changes, in which case the development teams are alerted, who will either fix the issue or revert the change. For all tests, baselines are established during milestone revisions, and used to compare only against the same server, framework revision, server

configuration, and environment. At the end of the development cycle, all tests are repeated with larger data sets on the release candidate to catch any regressions that were caused by last minute code changes, and any performance regressions caused by code integration.

5 Lab Releases

A Lab release is a **preview** of one or more features under development which have normally not been integrated into TRUNK yet. Lab release features are not part of the last DMR (development milestone release). Lab releases are created when the MySQL community voices interest in evaluating early work, and they are **snapshots** of the feature tree at a given point in time. Lab releases can have beta quality, or they can be available only on a limited set of platforms, or documentation can not be available. Finally, there is no guarantee that the features in a lab release will appear in future DMR or GA releases. Lab releases can be found at labs.mysql.com.

6 Development Milestone Releases

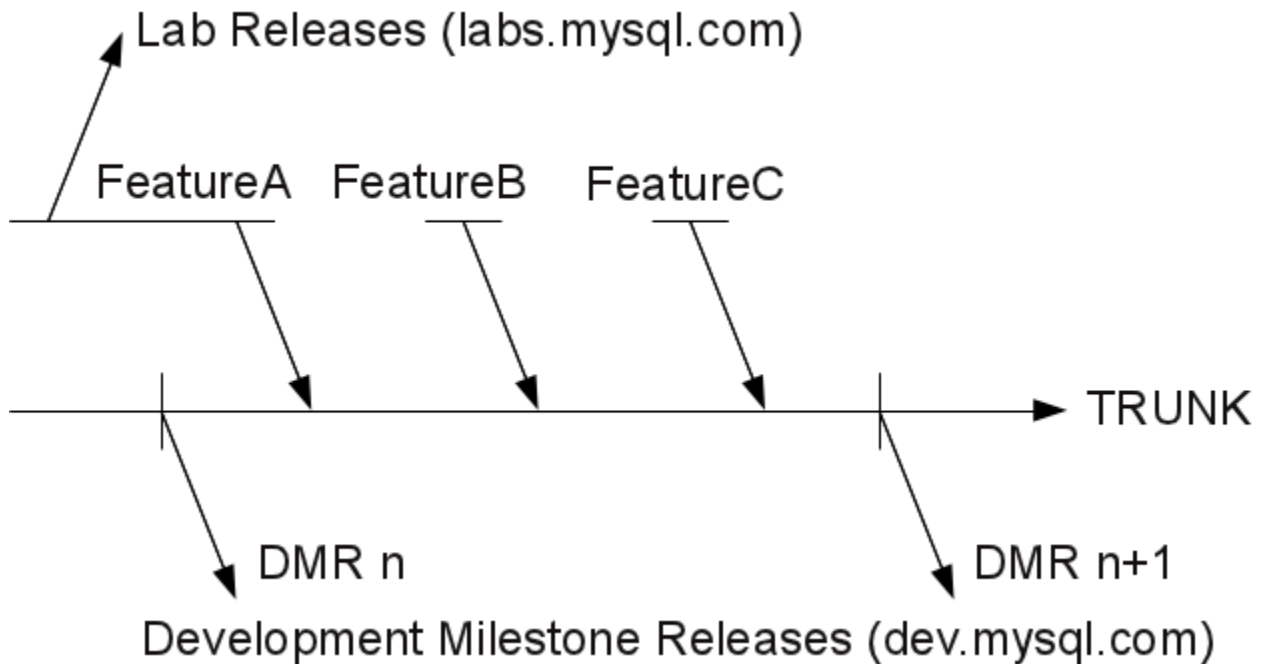
A development milestone release (DMR) is produced from TRUNK every 3-6 months and includes everything that is new in TRUNK since the previous DMR. The DMRs are made available on all supported platforms. The goal is to produce DMRs with RC (release candidate) quality.

The purpose of a DMR is to “release often”, as a service for early adopters, and to collect feedback from customers and users. That feedback is used to improve the next DMR. DMRs can be found on the [MySQL Developer Zone](#).

Development milestone releases are produced as follows:

- A release manager sets a DMR cut-off date for new features.
- The DMR will include all features that make it to TRUNK before the cut-off date.
- Features are developed and tested on independent feature trees and pushed to TRUNK only once approved by QA.
- After all features are pushed, TRUNK is locked and automated regression tests are run over the weekend.
- QA signs off TRUNK once test runs are green.
- The DMR is cloned off and put in a separate tree, and TRUNK is opened up again for normal work.
- QA runs extended tests on the cloned-off DMR; bugs found in the process are fixed, and eventually QA approves the DMR.
- The DMR is released and announced.

Figure 1 Milestone releases



7 General Availability (GA) Releases

GA releases are releases recommended for production systems. The overall goal is to produce a new GA release every 18 to 24 months. GA releases can be found on the [MySQL Developer Zone](#).

GA releases are produced as follows:

- A GA release is based on a DMR.
- The selected DMR undergoes additional testing and bug fixing; then a first RC (release candidate) is produced and made public.
- The release candidate undergoes evaluation by customers and users; this can cause a need for more RC cycles until GA quality will be reached.
- The GA release is released and announced.

Figure 2 GA Releases

