



#FOSDEM #MySQLDay #MySQL8isGreat



# Friends let real friends use MySQL 8.0



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BRUSSELS

Saverio Miroddi  
Senior Engineer at  ticketsolve



FRIENDS DON'T LET  
REAL FRIENDS USE  
RELATIONAL DATABASES



mongoDB.

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CLEAR CHANNEL

#15277

FRIENDS ~~DON'T~~ LET  
REAL FRIENDS USE  
~~RELATIONAL DATABASES~~

**MYSQL**



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## Introduction: Who are I and Ticketsolve

- ▶ Lead of invisible things at Ticketsolve
- ▶ Ticketsolve is a primary player in Ireland/UK in the events ticketing market, and it has an internal open source program
- ▶ Efficiency is one of our key values; this reflect in the presentation's tooling and general approach

## Introduction: Presentation and target audience

- ▶ We've been using MySQL for 10+ years
- ▶ We starting each migration process around 6 months after GA
- ▶ This presentation describes our experience in migrating to MySQL 8.0; it covers the most important concepts of what a sysadmin needs to know, and what they need to do, if "tomorrow they need to migrate production to 8.0"
- ▶ The most important subject is utf8mb4 (and its default collation)
- ▶ There is no target level, although the audience is system/database administrators



## Preparing MySQL: setup and tooling

- ▶ Use tarballs for convenience, and a fixed path with symlink
- ▶ As always, good tooling can make an experience very smooth
- ▶ PS. I'm running on full ZFS!!

First step: compare the global system variables

- ▶ Although we read the release notes for every release, including patch versions, approaching major version differences is very intimidating
- ▶ Comparing system variables is a good starting point
- ▶ Check out the bulky system variables, and filter them out

## Migrating to utf8mb4: Summary

- ▶ The new collation is the crucial aspect to consider
- ▶ What `utf8mb4\_0900\_ai\_ci` is and what it brings
- ▶ Very unfortunately, the documentation available in the web is outdated - it doesn't consider the 8.0 new collation



## How the charset parameters work

- ▶ What happens when a client connects to the server?
- ▶ Which are the database object charset-related defaults?

## Collation coercion, and issues `general` <> `0900\_ai`

- ▶ Comparisons `utf8\_general\_ci` columns <> literals (see next)
- ▶ Comparisons `utf8\_general\_ci` columns <> columns
- ▶ Moving a schema from `utf8mb4\_general\_ci` to `utf8mb4\_0900\_ai\_ci` is not trivial!

# Collation Coercibility in Expressions

- 0: An explicit COLLATE clause (not coercible at all)
- 1: The concatenation of two strings with different collations
- 2: The collation of a column or a stored routine parameter or local variable
- 3: A “system constant” (the string returned by functions such as USER() or VERSION())
- 4: The collation of a literal
- 5: The collation of a numeric or temporal value
- 6: NULL or an expression that is derived from NULL

(From <https://dev.mysql.com/doc/refman/8.0/en/charset-collation-coercibility.html>)

## Issues with `0900\_ai` collation padding

- ▶ How are trailing whitespaces handled?
- ▶ What defines such handling? (see next)

The following are the core string comparison rules from the SQL (2003) standard (section 8.2):

3) The comparison of two character strings is determined as follows:

a) Let CS be the collation [...]

b) **If the length in characters of X is not equal to the length in characters of Y, then the shorter string is effectively replaced, for the purposes of comparison, with a copy of itself that has been extended to the length of the longer string by concatenation on the right of one or more pad characters,** where the pad character is chosen based on CS. **If CS has the NO PAD characteristic, then the pad character is an implementation-dependent character** different from any character in the character set of X and Y that collates less than any string under CS. Otherwise, the pad character is a space.

## Triggers potential issues

- ▶ Triggers are fairly easy to handle (see next)
- ▶ Unrelated: triggers can be a very solid base for writing a database records event handler

```

SHOW CREATE TRIGGER enqueue_comments_update_instance_event\G

-- SQL Original Statement:
CREATE TRIGGER `enqueue_comments_update_instance_event`
AFTER UPDATE ON `comments`
FOR EACH ROW
trigger_body: BEGIN
    SET @changed_fields := NULL;

    IF NOT (OLD.description <=> NEW.description COLLATE utf8_bin AND CHAR_LENGTH(OLD.description) <=> CHAR_LENGTH(NEW.description)) THEN
        SET @changed_fields := CONCAT_WS(',', @changed_fields, 'description');
    END IF;

    IF @changed_fields IS NOT NULL THEN
        SET @old_values := NULL;
        SET @new_values := NULL;

        INSERT INTO instance_events(created_at, instance_type, instance_id, operation, changed_fields, old_values, new_values)
        VALUES(NOW(), 'Comment', NEW.id, 'UPDATE', @changed_fields, @old_values, @new_values);
    END IF;
END

-- character_set_client: utf8mb4
-- collation_connection: utf8mb4_0900_ai_ci
-- Database Collation: utf8mb4_0900_ai_ci

```



## Behavior with indexes

- ▶ How does an ``utf8mb4`` index behave when comparing with an ``utf8`` literal?
- ▶ How does it behave on joins? What does one see in the standard and extended ``EXPLAIN``s?

## Consequences of the increase in (potential) size of char columns

- ▶ utf8mb4 characters will take 33% more, which must stay within the InnoDB index limit, which is however (as of 8.0 default), high (3072 bytes).

### Remember:

- ▶ `[VAR]CHAR(n)` refers to the number of characters; therefore, the maximum requirement is  $4 * n$  bytes
- ▶ `TEXT` fields refer to the number of bytes

Mac Homebrew default collation is ``utf8mb4_general_ci``!

- ▶ When MySQL is installed via Homebrew, the default collation is ``utf8mb4_general_ci``.
- ▶ I've opened an issue and sent a PR
- ▶ Interim solution 1: edit the formula and rebuild mysql
- ▶ Interim solution 2: disable the server handshake

## `information\_schema\_stats\_expiry` introduction

- ▶ When querying the `information\_schema`, beware that stats are updated only once a day!
- ▶ If required, invoke `ANALYZE TABLE` (or reduce the setting value)

GROUP BY is now unsorted (not implicitly sorted)

- ▶ Developers will need to go through the codebase and check each query with GROUP BY
- ▶ It's impossible to use a one-size-fits-all approach

Very generic approaches:

- ▶ `grep -A`
- ▶ mini script checking every pair of lines

## Schema migration tool issues

- ▶ There's a known [showstopper bug](<https://github.com/github/gh-ost/issues/687>) on the latest Gh-ost release, which prevents operations from succeeding on MySQL 8
- ▶ Use trigger-based tools, like `pt-online-schema-change` v3.1.1 or v3.0.x (but v3.1.0 is broken!) or Facebook's OnlineSchemaChange

## Conclusion

- ▶ Over the next weeks, I will expand this subject into a series of articles in my professional blog
- ▶ This presentation is hosted (with git history preserved) at <https://github.com/saveriomiroddi/prefosdem-2020-presentation>
- ▶ Questions!



Extra: `innodb\_flush\_neighbors`

- ▶ The default is now disabled; watch out on spinning disks!