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MariaDB 10.4 Reverse Privileges

Vicențiu Ciorbaru
Software Engineer @ MariaDB Foundation
vicentiu@mariadb.org



Agenda

- MariaDB privilege system
- Privilege system tables
- Drawbacks
- Reverse privileges



Where did the idea come from?



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How can I restrict a MySQL user to a particular tables



Where did the idea come from?



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How can I restrict a MySQL user to a particular tables

```
SELECT CONCAT("GRANT UPDATE ON db.", table_name, " TO user@localhost;")
FROM information_schema.TABLES
WHERE table_schema = "YourDB" AND table_name <> "table_to_skip";
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SELECT CONCAT("GRANT UPDATE ON db.", table_name, " TO user@localhost;")  
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REALLY?!



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There has to be a better way!



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Not really :(



MariaDB access control internally

- MariaDB's tiered privilege system:
 - Global Privileges
 - GRANT SELECT ON *.* TO SuperUser;
 - Database (Schema) Privileges
 - GRANT SELECT ON wordpress.* TO WPAdmin;
 - Table Privileges
 - GRANT UPDATE ON wordpress.users TO WPAdmin;
 - Column Privileges
 - GRANT SELECT (user, content) ON wordpress.posts TO WPUser;
 - Other Privileges

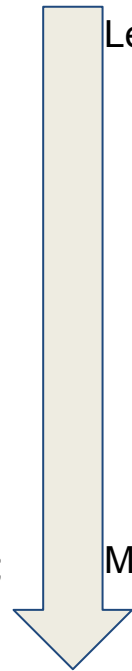


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Less Specific

More Specific





MariaDB access control internally

- When the server receives a query
 - Compute the necessary privileges to run the query
 - Are we running with privileges enabled?
 - Check the privilege cache
 - Check the user's global privileges
 - Check the user's database privileges
 - Check the user's table privileges
 - Check for specific column privileges.

- Repeat the process for current active role, if any



MariaDB access control internally

- All privilege definitions are additive
- If you want to restrict access to a resource
 - You need to grant access to everything else BUT that resource...
- What happens when the schema changes?
 - Update all users...



MariaDB access control internally

- The more objects there are, the bigger the system tables get.
- The bigger the system tables are, the slower privilege checking becomes.
- Contributions to MySQL 8.0 from Eric Herman aimed to address a performance slowdown when things running with too many users.

<https://mysql.wisborg.dk/2018/10/26/mysql-server-8-0-13-thanks-for-the-11-facebook-and-community-contributions/>



Where did the idea come from?

- We need a solution to "block" access
 - Refactoring the application is not a "solution" in many cases
- Low overhead!
- Make it play nice with the current system and give more control to the DBA.



Where did the idea come from?

- Is there a precedent?



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DENY  { ALL [ PRIVILEGES ] }  
      | <permission> [ ( column [ ,...n ] ) ] [ ,...n ]  
      [ ON [ <class> :: ] securable ]  
      TO principal [ ,...n ]  
      [ CASCADE ] [ AS principal ]  
[;]
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SQL Server Syntax



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```

SQL Server Syntax

- But SQL server behaviour is hard to explain.
 - A grant will undo a deny. ?!



How shall we do it?

- We want to make it easy for users to understand.
- Easy to reason about it!
 - No "hidden" side effects.
 - No Host Table shenanigans
- Goal: be able to explain the solution in one sentence.
- Solution:
 - DENY will trump everything!



How shall we do it?

- Once a DENY command has been run, that user (role) will not have access to the resource, unless the DENY is specifically revoked.
- Any additional grants, aside from explicitly removing the DENY, can not grant access.



Denying privileges

- The project is still under development
 - New foundation developers - Rutuja Surve
- Syntax similar to GRANT / REVOKE:

DENY <priv> ON <resource> TO <user>

- How to undo a deny?

REVOKE DENY <priv> ON <resource> FROM <user>



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Can we do better?



Denying privileges

- How will the new algorithm work:
- Run a second pass through the user's grants
 - If there is a DENY present, the query will not be allowed (or will return partial results)
- Performance impact?
 - Practically none for GLOBAL, DATABASE and TABLE privileges (checked at the same time)
 - Slightly more work if specific column denies.
 - Offset by fewer column entries overall.



Denying privileges

- Details:
 - Only users with SUPER privilege or READ access to system tables can view denies with SHOW GRANTS.
 - Roles with DENY will block the user's grants too when active.
 - Host table is already removed in 10.4, any entries will be migrated via reverse privileges if possible.



Denying privileges

- MariaDB 10.4 is still in Alpha
- Feedback now can still be incorporated before Beta release.



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Rate My Session

The screenshot shows a mobile application interface for 'Rate My Session'. At the top, there is a blue header with a menu icon, the text 'Schedule Timezone', and a search icon. Below the header, a calendar view shows sessions for Monday 3 and Wednesday 5. A session titled 'Introducing gh-ost: triggerless, painless, trusted online schema migrations' is highlighted in green. A blue overlay window titled 'Details' is open over this session, showing the title, time '11:20 - 12:10', and location 'Matterhorn 2'. Below the details, there is a 'Rate & Review' button with a speech bubble icon. A green callout box with an arrow points to this button, containing the text 'TAP TO RATE & REVIEW'. Below the button, the session description is visible: 'gh-ost is a MySQL replication-based tool which changes the paradigm of MySQL online schema changes, designed to overcome today's limitations and difficulties in online migrations.' At the bottom, there is a 'SPEAKERS' section with two entries: 'Shimi Noach, Senior Infrastructure Engineer, GitHub' and 'Tom Kouper, Sr. Database Infrastructure Eng., GitHub'. A blue plus button is located at the bottom right of the speakers list.

Thank You!

Contact me at:
vicentiu@mariadb.org

Blog:
mariadb.org/blog
