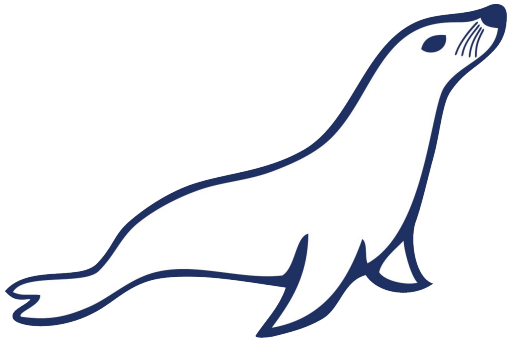

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MariaDB 10.4 Reverse Privileges

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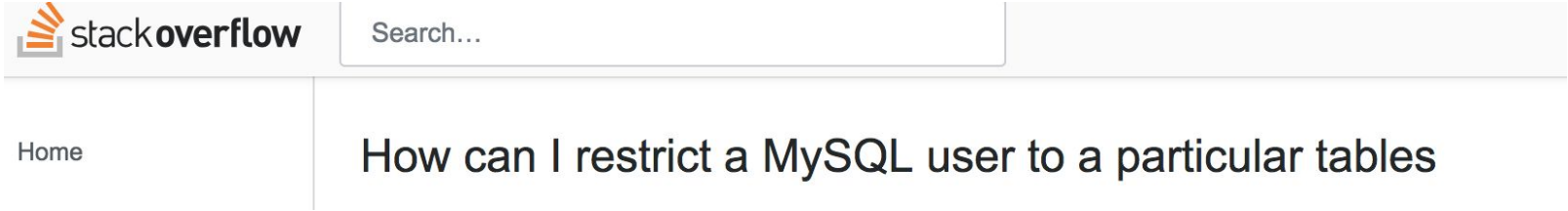
Agenda

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

Where did the idea come from?



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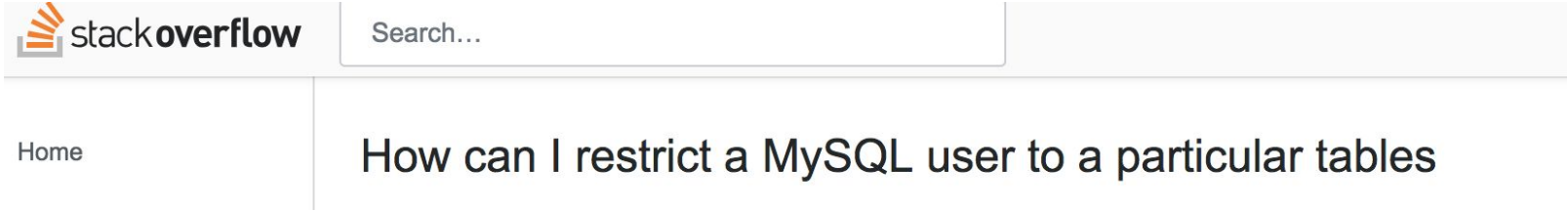


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SELECT CONCAT("GRANT UPDATE ON db.", table_name, " TO user@localhost;")
FROM information_schema.TABLES
WHERE table_schema = "YourDB" AND table_name <> "table_to_skip";
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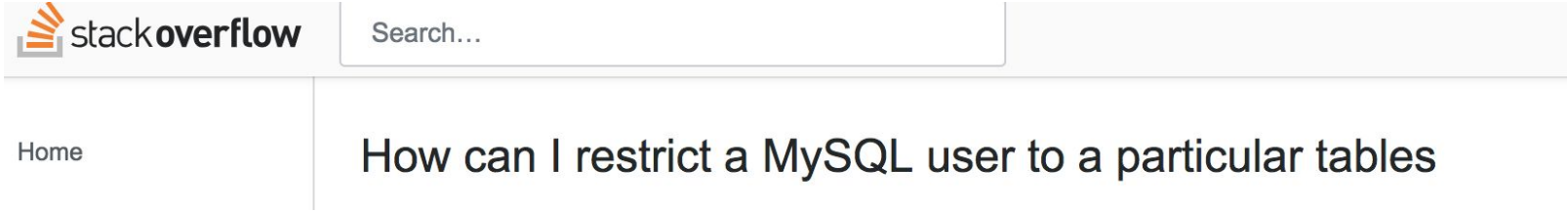


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REALLY?!

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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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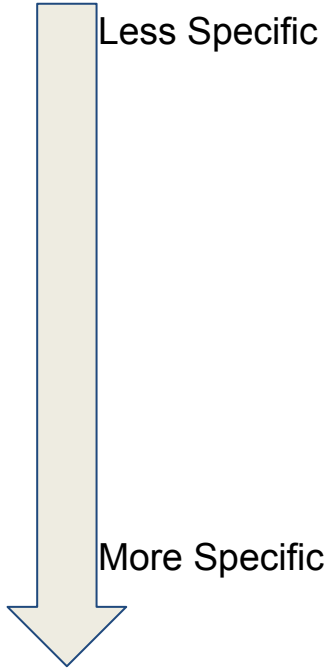

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MariaDB access control internally

- 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.

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    [ ON [ <class> :: ] securable ]
    TO principal [ ,...n ]
    [ CASCADE] [ AS principal ]
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SQL Server Syntax

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- Is there a precedent?
- SQL Server has similar functionality!

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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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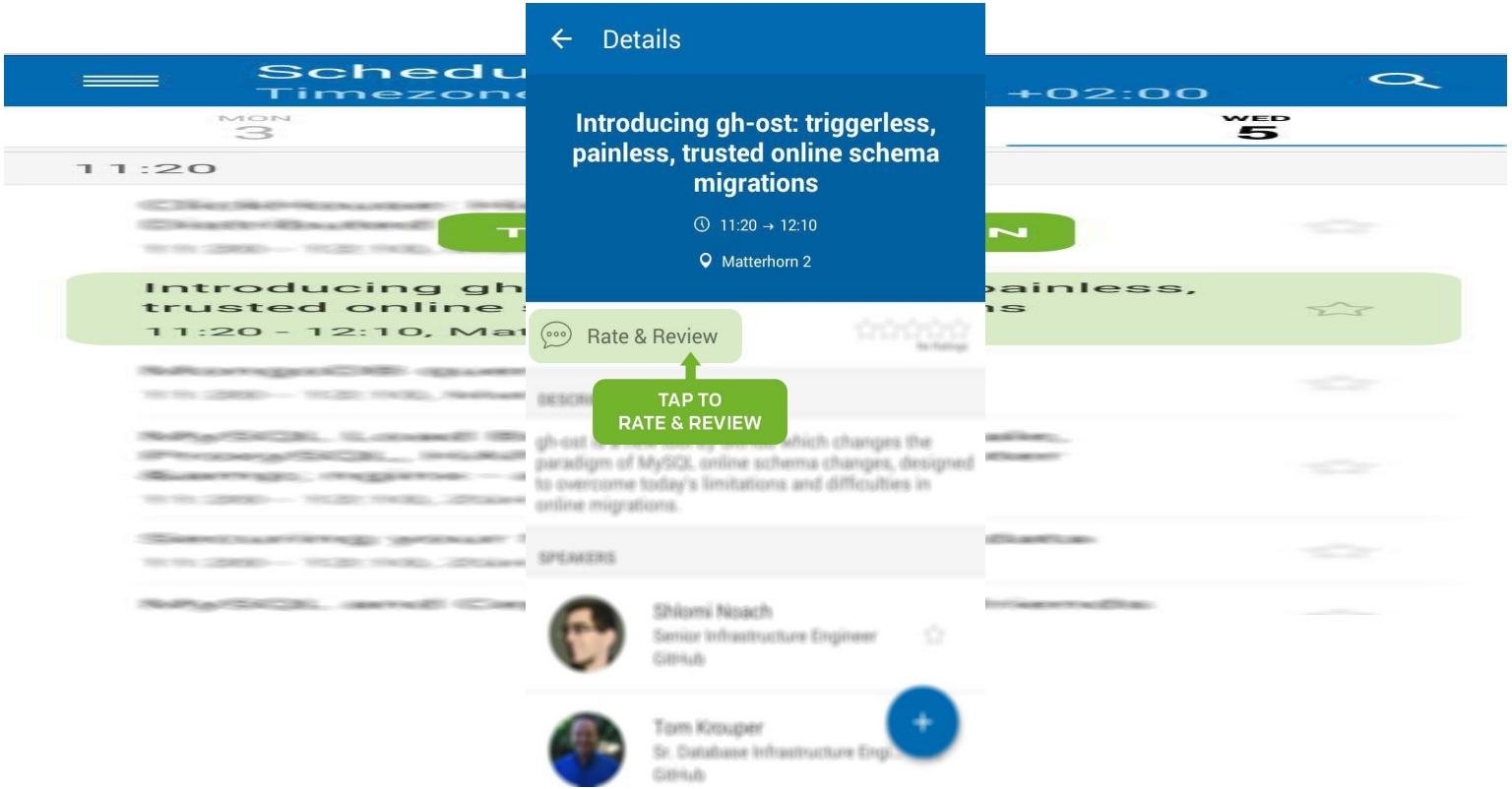

Thank You!

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