MariaDB Connection_ID()

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Oli Sennhauser

CTO, FromDual GmbH

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Connection_ID()

- **Exists since long ago!**

  - **→ Demo**

  - `SELECT CONNECTION_ID();`

- **Maximum number of connections created:**

```
SQL> SHOW GLOBAL STATUS LIKE 'Connections';
+---------------+-------+
| Variable_name | Value |
+---------------+-------+
| Connections   | 2322  |
+---------------+-------+
```

- **So: Boring feature, why bother?**

- **Some interesting investigations!**

Connection ID vs thread ID

- **Unfortunately ambiguously used:**

- `Connection_ID` → **ID of a connection**

- **But `thread_id` is also used sometimes for the ID of a connection (in `I_S`)! :-(**

- `ID (SHOW PROCESSLIST)` → **ID of a connection**

- `PROCESSLIST_ID` → **ID of a connection in `P_S`**

- `THREAD_ID` → **ID of a MariaDB thread (in `P_S`)**

- **So be careful (especially in `P_S`)!**

- **So where is the `Connection_ID` used then?**

PROCESSLIST

- `Connection_ID` **is called** `ID`!

- **You can filter your own connection out:**

```
SQL> SELECT id AS connection_id, user, host
     , IFNULL(CONCAT(SUBSTR(info, 1, 32), '...'), '') AS query
  FROM information_schema.processlist;
 WHERE id != CONNECTION_ID();
+---------------+-------------+------------------+-------------------------------------+
| connection_id | user        | host             | query                               |
+---------------+-------------+------------------+-------------------------------------+
|          2383 | root        | localhost        | SELECT id AS processlist_id, use... |
|             6 | system user |                  |                                     |
|          2398 | app         | localhost:35512  |                                     |
|          2392 | root        | localhost        |                                     |
+---------------+-------------+------------------+-------------------------------------+
```

- **Alternatives:**

  - `SHOW [FULL] PROCESSLIST;`

  - `SELECT * FROM performance_schema.threads;`

Latest Deadlock

- **InnoDB Monitor**
  `SHOW ENGINE INNODB STATUS\G`

```
*** (1) TRANSACTION:
TRANSACTION 17064867, ACTIVE 17 sec starting index read
MySQL thread id 7778, OS thread handle 0xb9c, query id

...

*** (2) TRANSACTION:
TRANSACTION 17063837, ACTIVE 173 sec starting index read
MySQL thread id 7765, OS thread handle 0x13c0, query id
```

Latest Foreign Key Error

- **InnoDB Monitor**
  `SHOW ENGINE INNODB STATUS\G`

```
2021-08-19 15:09:19 7fbb6c328700 Transaction:
TRANSACTION 543875059, ACTIVE 0 sec inserting

MySQL thread id 124441421, OS thread handle 0x7fbb6c328700,
query id 7822461590 192.168.1.42 fronmdual update

INSERT INTO contact (user_id, contact_id) VALUES
Foreign key constraint fails for table `test`.`contact`
```

Running Transactions

- ## InnoDB Monitor
  `SHOW ENGINE INNODB STATUS\G`

```
Trx id counter 2499
Purge done for trx's n:o < 2486 undo n:o < 0 state:
History list length 12
LIST OF TRANSACTIONS FOR EACH SESSION:
---TRANSACTION (0x7f70d6b93330), ACTIVE 3 sec
mysql tables in use 1, locked 0
0 lock struct(s), heap size 1128, 0 row lock(s)
MariaDB thread id 2398, OS thread handle 140122589112064
select * from test.test
Trx read view will not see trx with id >= 2499, sees < 2499
```

`P_S.treads` view

- **Conversion from MariaDB** `Connection_ID()` **to** `P_S.thread_id`

```
SQL> SELECT thread_id, processlist_id AS connection_id
  FROM performance_schema.threads
 WHERE processlist_id = CONNECTION_ID();
+-----------+---------------+
| thread_id | connection_id |
+-----------+---------------+
|      2369 |          2321 |
+-----------+---------------+
```

PERFORMANCE_SCHEMA

- **processlist_id**
  - **session_account_connect_attrs, session_connect_attrs**

- **thread_id**
  - **events_stages_*, events_statements_*, events_transactions_*, events_waits_***
  - **memory_summary_by_thread_by_event_name**
  - **socket_instances**
  - **status_by_thread**
  - **user_variables_by_thread**

- **Related thread_ids**
  - **threads.PARENT_THREAD_ID**
  - **metadata_locks.OWNER_THREAD_ID**
  - **mutex_instances.LOCKED_BY_THREAD_ID**
  - **prepared_statements_instances.OWNER_THREAD_ID**
  - **table_handles.OWNER_THREAD_ID**
  - **rwlock_instances.WRITE_LOCKED_BY_THREAD_ID**

sys Schema views

- **`thread_id` (but not the `connection_id`):**
- `io_by_thread_by_latency`
- `latest_file_io`
- `memory_by_thread_by_current_bytes`
- `processlist`
- `schema_table_lock_waits`
- `session_ssl_status`

`Connection_ID` in Log Files

- **Error Log:**

```
2021-11-25 16:22:34 1796 [Warning] Hostname 'chef' does not resolve to ...
2021-11-25 16:22:34 1796 [Note] Hostname 'chef' has the following IP addresses:
2021-11-25 16:22:34 1796 [Note]  - 192.168.1.142
2021-11-25 16:22:34 1796 [Warning] Aborted connection 1796 to db: 'unconnected' ...
2021-11-26 16:09:14 2397 [Warning] Access denied for user 'app'@'localhost' ...
```

- **Slow Query Log**

```
# Time: 210729  9:22:57
# User@Host: root[root] @ localhost []
# Thread_id: 34  Schema: test  QC_hit: No
# Query_time: 0.003995  Lock_time: 0.000114  Rows_...
# Rows_affected: 0  Bytes_sent: 79445
SET timestamp=1627543377;
select * from test;
```

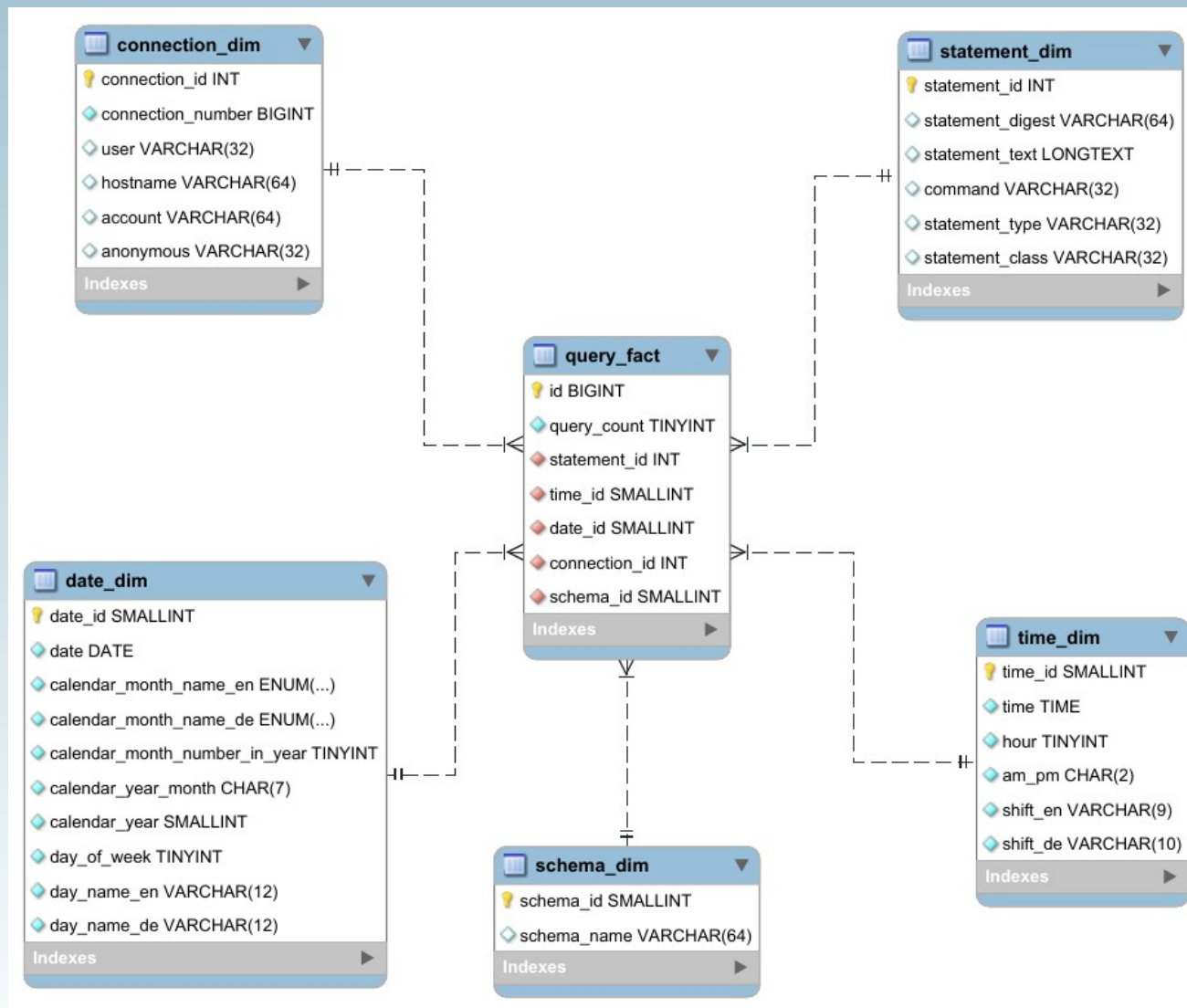- **But here again: `thread_id` :-(**

General Query Log

- Up to here it was more or less boring!

- But now comes the clue: With the General Query Log we get the exact understanding of what is going on for each and every connection:

```
220108 22:18:02 4568 Connect  fpmmm_agent@localhost ...
                4568 Query    SET NAMES utf8
                4568 Query    SHOW GRANTS
                4568 Query    SELECT "focmm"
                4568 Query    SHOW GLOBAL VARIABLES
                4568 Query    SHOW /*!50000 GLOBAL */ ...
                4568 Quit
```

- Enable on the fly with: `SET GLOBAL general_log = ON;`

  - Caution: Size of General Query Log file!

  - Overhead: ~13% (sysbench oltp_ps)

DWH of General Log

`Connection_ID` missing in

- **MariaDB SQL Error Log**

    - **For those who do not know: Plug-in**

    - **Logs errors sent to clients/applications!**

    - **→ Hint to MariaDB Devs?**

        - **https://jira.mariadb.org/browse/MDEV-27129**

        - **Possible fix is there!**

- **Binary Logs**

    - **→ Hint to MariaDB Devs?**

    - **Would not cost and harm much?**

Audit Plugin

- **MariaDB Audit Plugin Log:**

```
20211126 17:19:01,chef,app,localhost,2477,18407,QUERY,,'SELECT DATABASE()',0
20211126 17:19:01,chef,app,localhost,2477,18409,QUERY,test,'show databases',0
20211126 17:19:01,chef,app,localhost,2477,18410,QUERY,test,'show tables',0
20211126 17:19:02,chef,app,localhost,2477,18423,QUERY,test,'select * from test limt 10',1064
20211126 17:19:05,chef,app,localhost,2477,18424,READ,test,test,
20211126 17:19:05,chef,app,localhost,2477,18424,QUERY,test,'select * from test limit 10',0
20211126 17:19:38,chef,app,localhost,2477,18426,QUERY,test,'select connection_id()',0
20211126 17:19:52,chef,app,localhost,2477,0,DISCONNECT,test,,0
```

InnoDB Locking

- **Finding InnoDB locking transaction / Connection_ID**
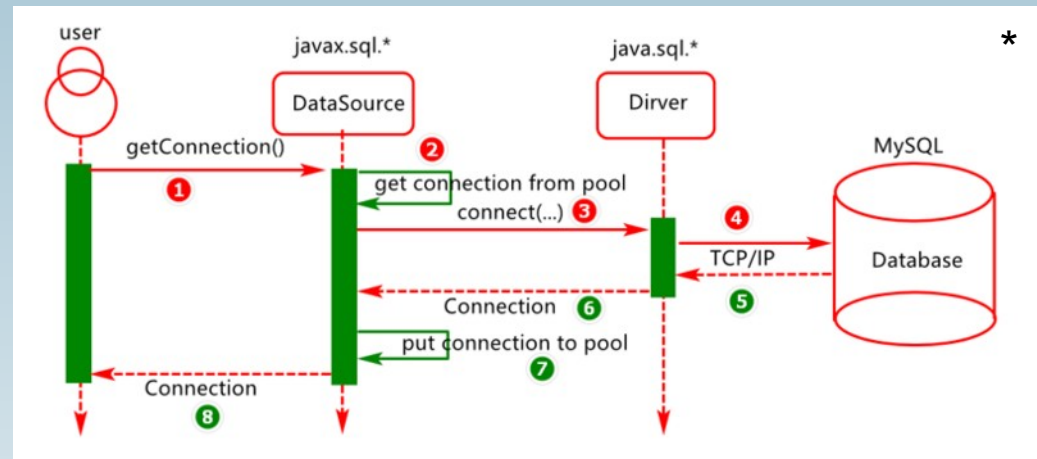
```
SELECT /* r.trx_id waiting_trx_id, */ r.trx_mysql_thread_id AS waiting_connection_id
     , /* t1.thread_id AS waiting_thread_id
     , r.trx_started, r.trx_query waiting_query
     , b.trx_id blocking_trx_id, */ b.trx_mysql_thread_id AS blocking_connection_id /*
     , t2.thread_id AS blocking_thread_id
     , b.trx_started, b.trx_query blocking_query */
  FROM information_schema.innodb_lock_waits AS w
  JOIN information_schema.innodb_trx AS b ON b.trx_id = w.blocking_trx_id
  JOIN information_schema.innodb_trx AS r ON r.trx_id = w.requesting_trx_id
  JOIN performance_schema.threads AS t1 ON t1.processlist_id = r.trx_mysql_thread_id
  JOIN performance_schema.threads AS t2 ON t2.processlist_id = b.trx_mysql_thread_id
;
+-----------------------+------------------------+
| waiting_connection_id | blocking_connection_id |
+-----------------------+------------------------+
|                   583 |                    582 |
|                   930 |                    584 |
+-----------------------+------------------------+
```

Problems?

- **Application Connection Pooling (CP)**
  - **Typically Java/.NET**

- **Pseudo thread ID**
  - **MySQL feature since 8.0.14**
  - **Possibly implemented in MariaDB as well sooner or later?**
  - **Variable `pseudo_thread_id` changes `CONNECTION_ID()`**

  * https://developpaper.com/spring-boot-integrates-connection-pool/

Literature

- **Other related information and use cases:**

  - **Aborting MariaDB connections**
    https://fromdual.com/abbrechende-mariadb-mysql-verbindungen

  - **Failed MySQL DDL commands and Galera replication**
    https://fromdual.com/failed-mysql-ddl-commands-and-galera-replication

  - **MariaDB Connection ID**
    https://fromdual.com/mariadb_connection_id

Thank you!

Questions ?

Discussion?

We have some time for a personal talk...

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