MariaDB Point-in-Time-Recovery (PiTR)

FOSDEM 2022, virtual

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https://www.fromdual.com/presentations

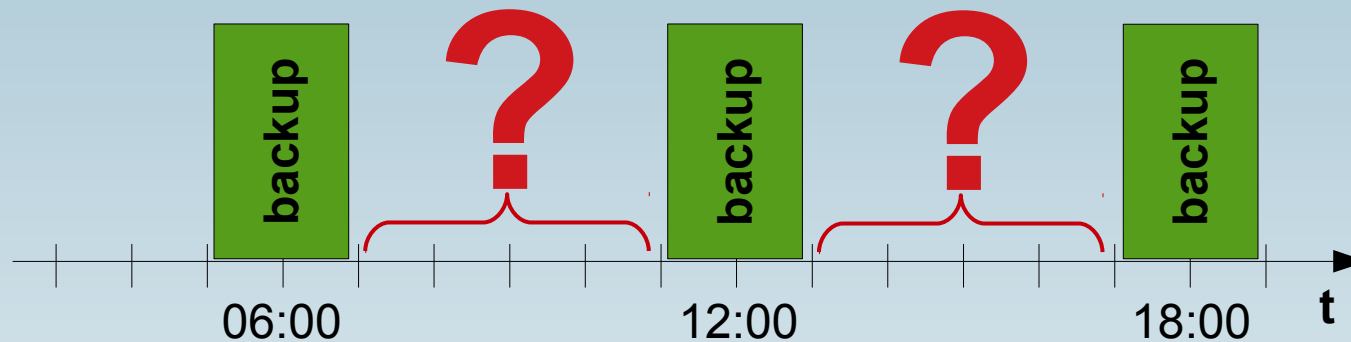# How are you doing backups?

- **Most of us do backups? Why?**

  - **Hardware gets broken
    → You are too slow to fix hardware! This can take hours to days to recover! → HA**

  - **Logical errors
    → Most common error type!
    e.g. `DROP TABLE ...`**

- **How are we doing backup?**

  - **Logical: `mariadb-dump`**

  - **Physical: `mariadb-backup`**

Point-in-Time-Recovery (PITR)

- **Some of us do several backups a day (pulsed backup):**

- **How many hours between the backups?**

- **But what is in between?**

- **This is where PiTR comes into play!**

  - **Recover ALL changes since LAST full backup! By replaying the binary logs...**

Binary Logs

- **We must record all the DB changes after the last backup**

  - **Or better: All the changes at all**

- **This is done with enabling the "Binary Logs" = Change Log, Journal of the DB**

```
# /etc/mysql/mariadb.conf.d/99-fromdual.cnf

[mariadbd]

log_bin        = /var/log/mariadb/binary-log
binlog_format = ROW    # Recommended, see later
```

- **Enabling Binary Logs requires DB restart!**

Logical Backup for PiTR

- **We need a consistent Full Backup of the DB**

- **Our recommendation for Logical Backup:**

```
# for only InnoDB tables!!!
mariadb-dump --user=root --all-databases --flush-logs \
--single-transaction --master-data=1 --flush-privileges \
--quick --triggers --routines --events \
--hex-blob > /var/backup/full_dump.sql
```

Physical Backup for PiTR

- **We need a consistent Full Backup of the DB**

- **Our recommendation for Physical Backup:**

```
mariadb-backup --user=root --backup --target-dir=/var/backup
mariadb-backup --user=root --prepare --target-dir=/var/backup
```

- **You need physical access to the DB files!**

* Wish to the developers: `--backup-and-prepare` Option!!!

Restore backup

- ## Restore logical Backup

```
cat /var/backup/full_dump.sql | mariadb --user=root
```
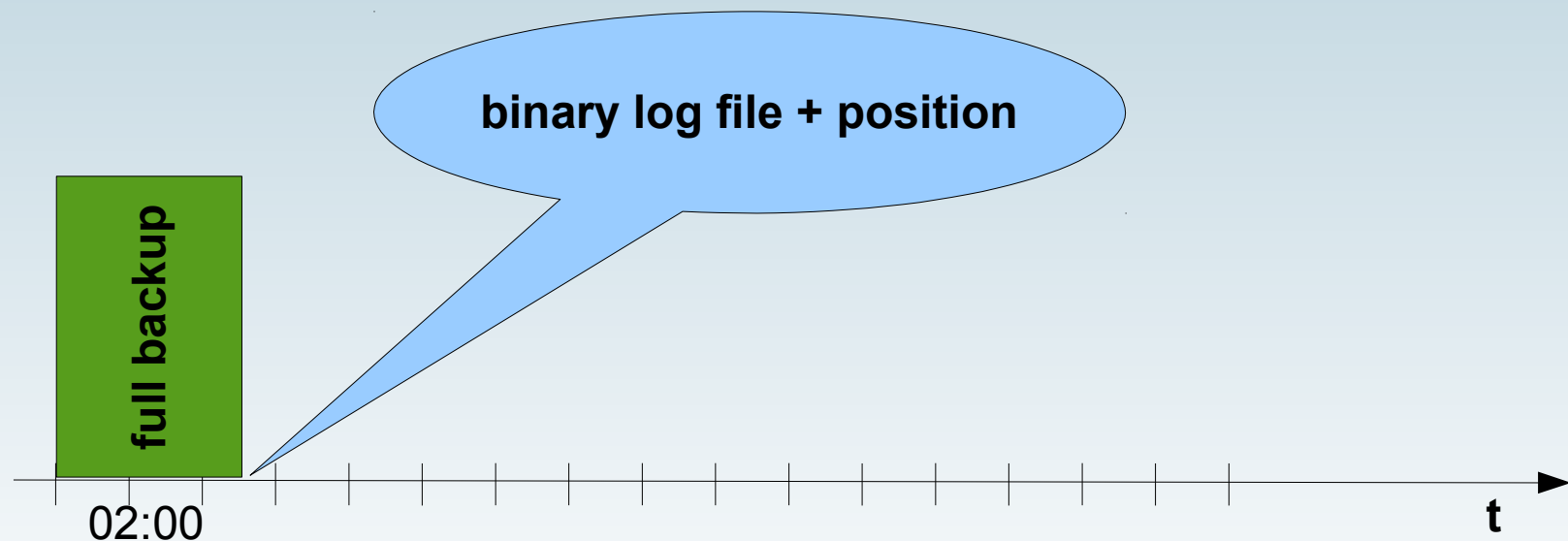
- ## Restore physical Backup

```
rm -rf /var/lib/mysql/*
mariadb-backup --copy-back \
--datadir=/var/lib/mysql --target-dir=/var/backup
chown -R mysql: /var/lib/mysql
```

* Wish to the developers: remember ownership of the files?

Point-in-Time-Recovery

- **We need exact point in time of the backup in the Binary Log stream**

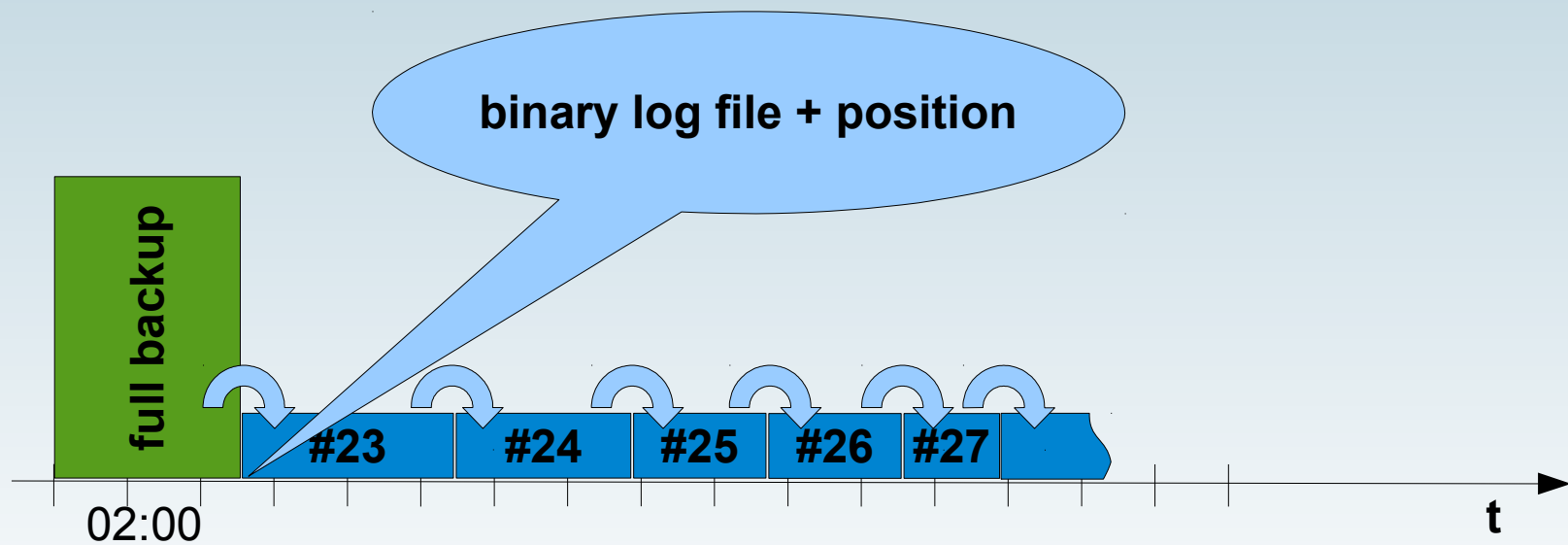 **→ Binary Log File and Position**

Starting point for PiTR?

- **mariadb-dump:**

```
head -n 25 /var/backup/full_dump.sql
18 --
19 -- Position to start replication or point-in-time recovery from
20 --
21
22 CHANGE MASTER TO MASTER_LOG_FILE='binary-log.000023', MASTER_LOG_POS=429;
```

- **mariadb-backup:**

```
cat /var/backup/xtrabackup_binlog_info
binary-log.000023  429     0-3324-563
```

Point-in-Time-Recovery

Point-in-Time-Recovery

- **How to do a PiTR:**

```
mariadb-binlog --disable-log-bin \
--start-position=429 \
--stop-datetime='2022-02-01 13:59:00' \
binary-log.000023 binary-log.000024 \
binary-log.000025 … | mariadb --user=root
```

- **To be more precise: `--stop-position` can be used!**

  - **Needs `mariadb-binog` utility to find exact stop position.**

- **First try against `less` to check if you got it right!**

Advanced: Flashback

- ## Instead of doing all this:
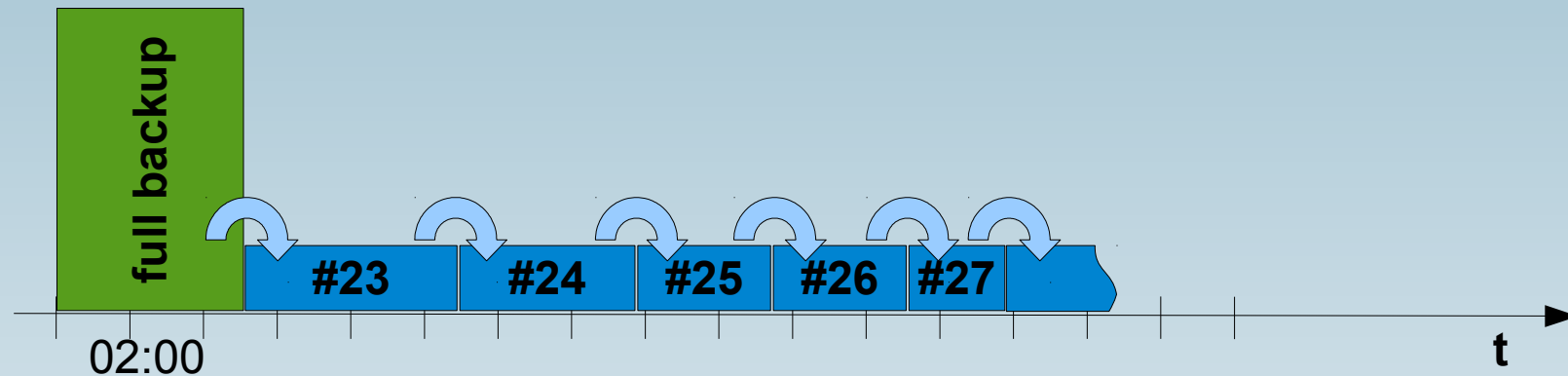
- ## What about just fixing the logical error?

- ## Binary Log Flashback → Reverse DML operation (needs `binlog_format = ROW`)

```
mariadb-binlog --flashback --start-position=348622898 \
--stop-position=349828120 binary-log.000080 \
| mariadb --user=root test --force
```

Advanced: GTID PiTR

- **New feature in MariaDB 10.8!**

```
mariadb-dump --gtid --master-data=1 ...

25 -- GTID to start replication from
28 CHANGE MASTER TO MASTER_USE_GTID=slave_pos;
29 SET GLOBAL gtid_slave_pos='0-3322-4';

mariadb-binlog --gtid-strict-mode --start-position=0-3322-4 \
--stop-position=0-3322-7 chef_mariadb-108_binlog.* | mariadb
```

- **Stop GTID is inclusive!!! (`--stop-position`)**

- **Literature:**

   https://mariadb.com/kb/en/mariadb-1080-release-notes/

   https://jira.mariadb.org/browse/MDEV-4989

Test your restore!!!

- **Personal advice: Test your restore!!!**
- **Why should you test your restore?**

- **Your restore might not work at all!?!**
  - **And you find it out much, much later...**
- **Restore can take a very long time............**
  - **Verify your MTTR or RTO/RPO!**
    - **MTTR - Mean Time to Repair**
    - **RTO - Recovery Time Objective**
    - **RPO - Recovery Point Objective**
- **Getting experience!**

Thank you!

Questions ?

Discussion?

We have some time for a personal talk...

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