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MySQL Clone

A better way to migrate databases

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- Doing MySQL server development since 2006
- Based in Plovdiv, Bulgaria 🇧🇬
- Works on security features, MySQL wire protocol, plugins
- Speaker at OpenSUSE conferences since 2013 🇸🇰

What is MySQL Clone ?

*A simple and efficient way to create
a MySQL instance replica*

Why Yet Another Method ?

- **It's easy to use**: a single command
- It's a data snapshot with **consistent GTID and binary log position**
- Data can be cloned locally or from **remote**
- **It's resumable !**

It's **FASTER** Too !



<https://mydbops.wordpress.com/2019/11/14/mysql-clone-plugin-speed-test/>

2 servers

CPU: 2 Cores

RAM: 4 GB

DISK: 200 GB SSD

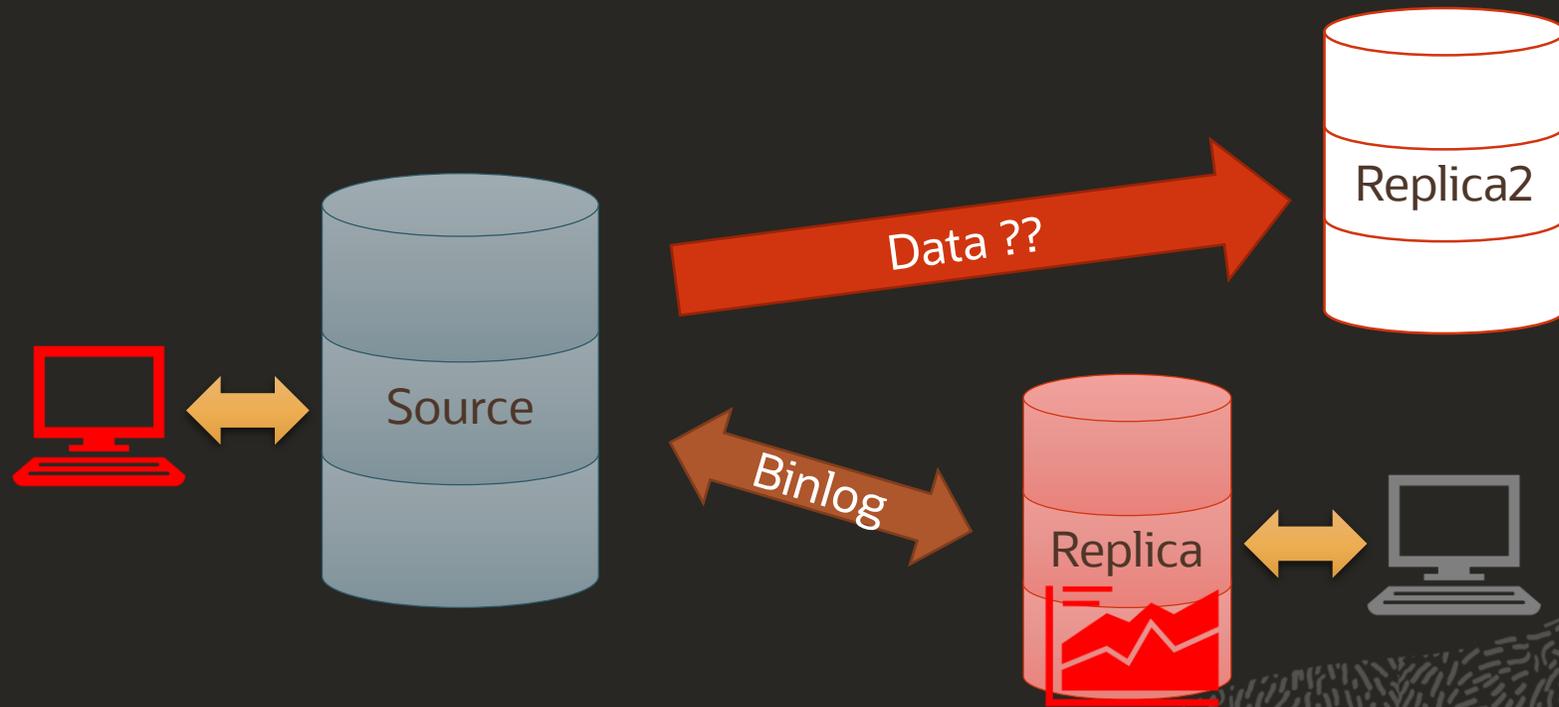
approx. **122.40 GB** data from sysbench

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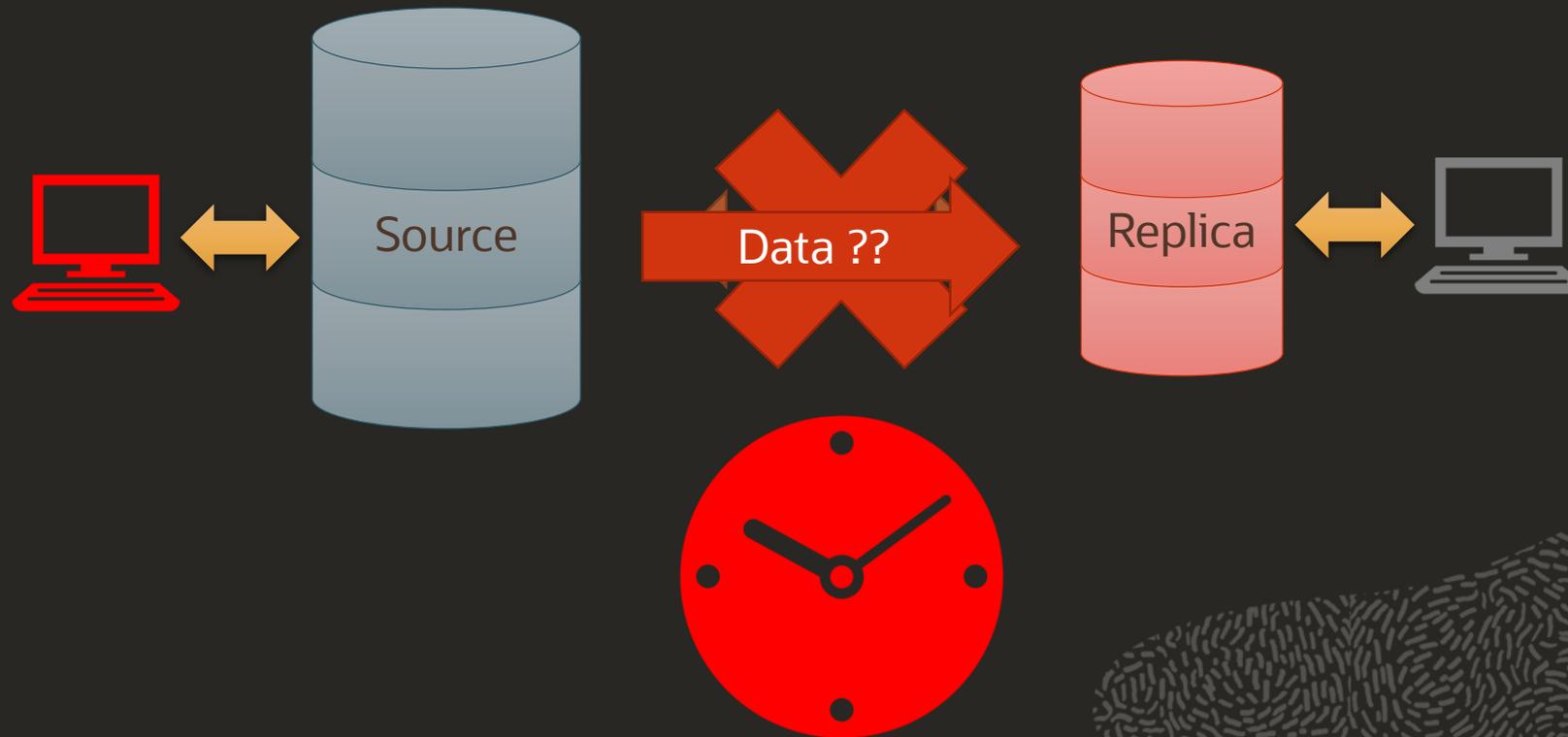


Clone: Use Cases

Provision a new replication node



Re-provision a returning node



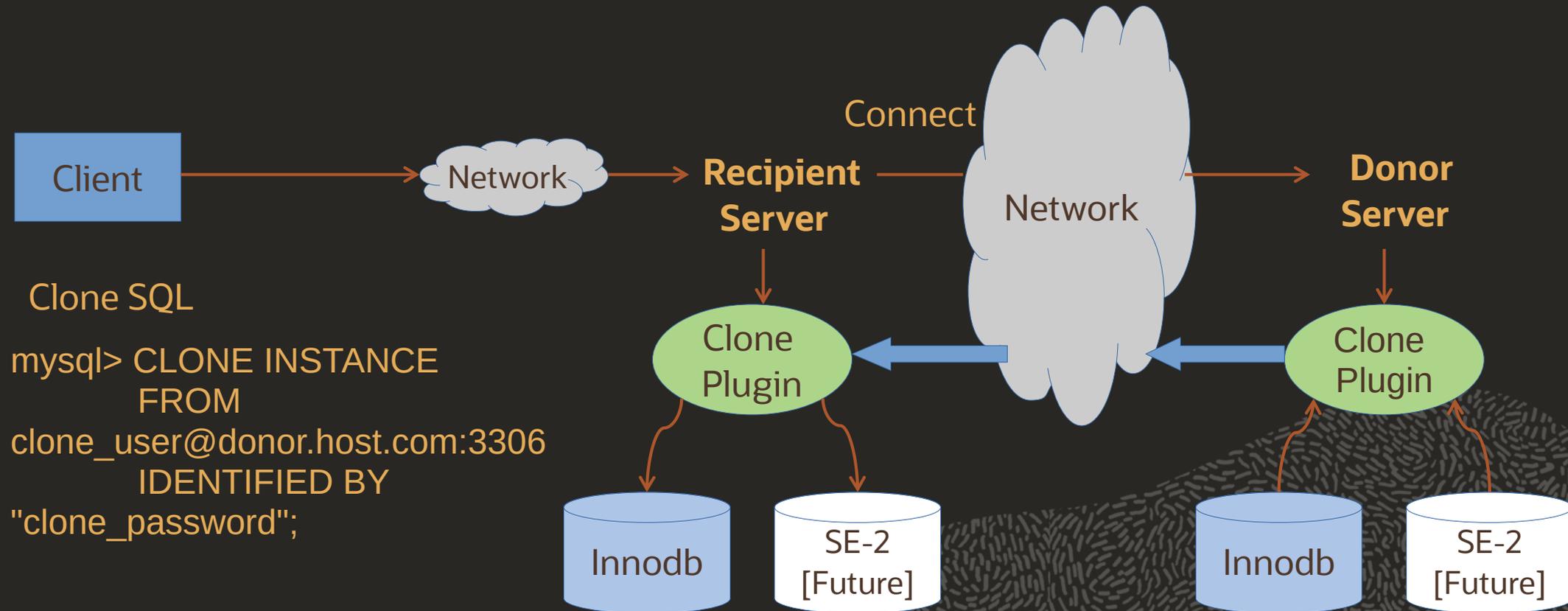
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Clone: Operation

Terminology



The big picture



Clone SQL

```
mysql> CLONE INSTANCE  
FROM  
clone_user@donor.host.com:3306  
IDENTIFIED BY  
"clone_password";
```

Prerequisites on the Donor

- Install the plugin:
INSTALL PLUGIN clone SONAME 'mysql_clone.so';
- Grant BACKUP_ADMIN to a user account
CREATE USER foo ...;
GRANT BACKUP_ADMIN TO foo;

Prerequisites on the Recipient

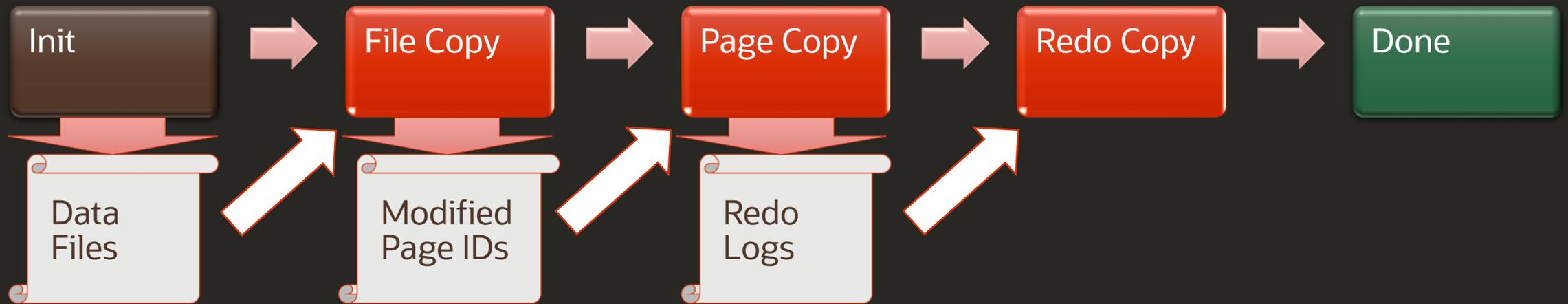
- Install the plugin:
INSTALL PLUGIN clone SONAME 'mysql_clone.so';
- Grant CLONE_ADMIN to a user account
CREATE USER bar ...;
GRANT CLONE_ADMIN TO bar;
- Allow the donor host
SET GLOBAL clone_valid_donor_list='donor_computer:3306';

On the recipient, as “bar”

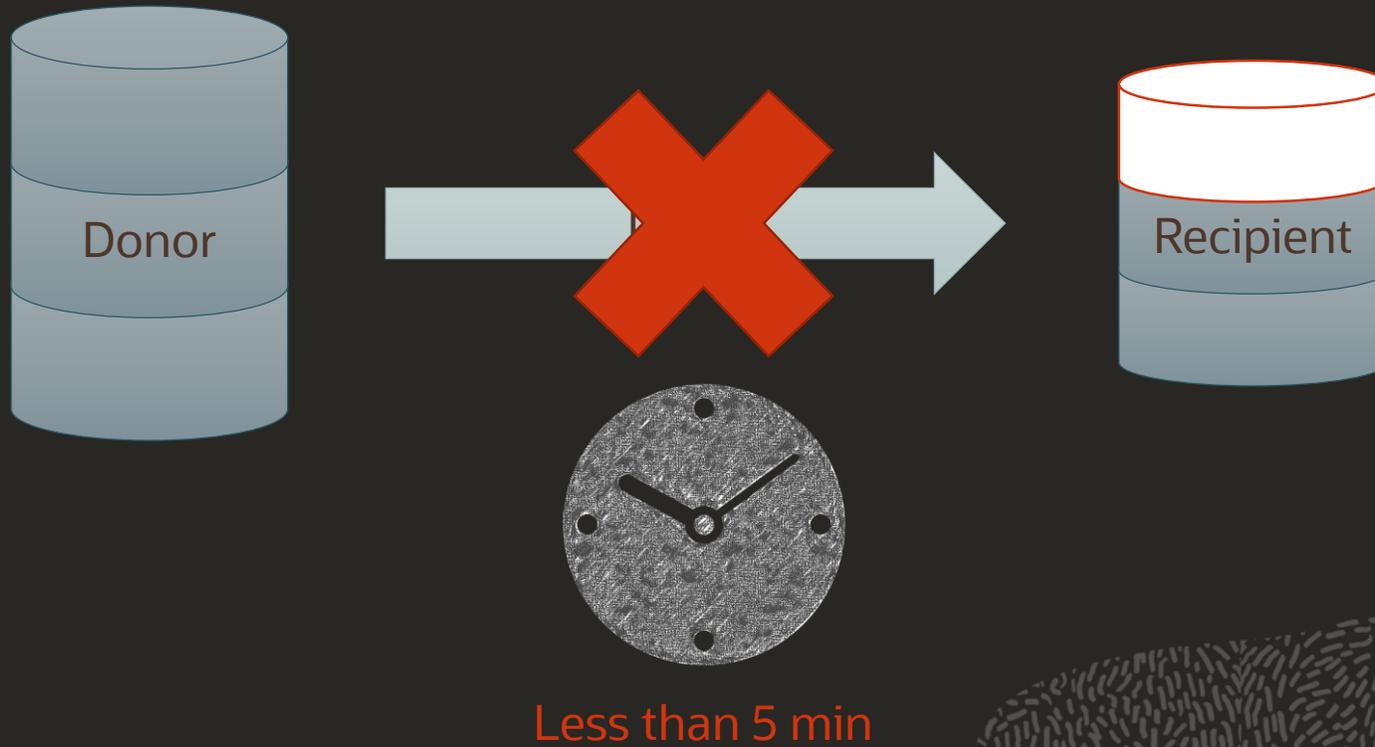
```
CLONE INSTANCE FROM foo@donor_computer:3306  
IDENTIFIED BY 'foo_pwd'  
DATA DIRECTORY = 'clone_dir'  
REQUIRE SSL
```

Clone: What Has Just Happened ?

Clone Stages



Clone: Network Failure Recovery



Clone Monitoring: performance_schema.clone_status

```
mysql> SELECT STATE FROM performance_schema.clone_status;
```

```
+-----+  
| STATE |  
+-----+  
| Completed |  
+-----+
```

Clone Monitoring: performance_schema.clone_progress

```
mysql> SELECT STAGE, STATE, END_TIME FROM performance_schema.clone_progress;
```

stage	state	end_time
DROP DATA	Completed	2020-09-27 14:45:43.141261
FILE COPY	Completed	2020-09-27 14:45:44.457572
PAGE COPY	Completed	2020-09-27 14:45:44.577330
REDO COPY	Completed	2020-09-27 14:45:44.679570
FILE SYNC	Completed	2020-09-27 14:45:44.918547
RESTART	Completed	2020-09-27 14:45:48.583565
RECOVERY	Completed	2020-09-27 14:45:49.626595

Performance And Resource Use Control

Variable	Type	Meaning
clone_max_concurrency	Int	(Maximum) number of cloning threads
clone_autotune_concurrency	Bool	Enable dynamic spawning of cloning threads
clone_max_network_bandwidth	Int, Mbps	(recipient only) limit network usage
clone_max_data_bandwidth	Int, Mbps	(recipient only) limit clone transfer rate

Clone Limitations

- Does not clone configuration values
- Does not clone binary logs
- Supports only InnoDB
- Blocks all concurrent DDLs on the Donor
- Will **FULLY** override recipient data
- Only to the **SAME** server version
- Only on the same OS and platform
- Doesn't work over the X protocol

Further Reading

- Reference Manual
 - <https://dev.mysql.com/doc/refman/8.0/en/clone-plugin.html>
- Blogs
 - <https://mysqlservertimeam.com/clone-create-mysql-instance-replica/>
 - <https://mysqlhighavailability.com/mysql-innodb-cluster-automatic-node-provisioning>
 - <https://mysqlhighavailability.com/a-breakthrough-in-usability-automatic-node-provisioning>
 - <https://mysqlhighavailability.com/automatic-provisioning-in-group-replication>
- InnoDB cluster video
 - <https://lefred.be/content/migrate-from-a-single-mysql-instance-to-mysql-innodb-cluster-using-clone-plugin/>

Thank you !

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