

Activitat: recuperació completa

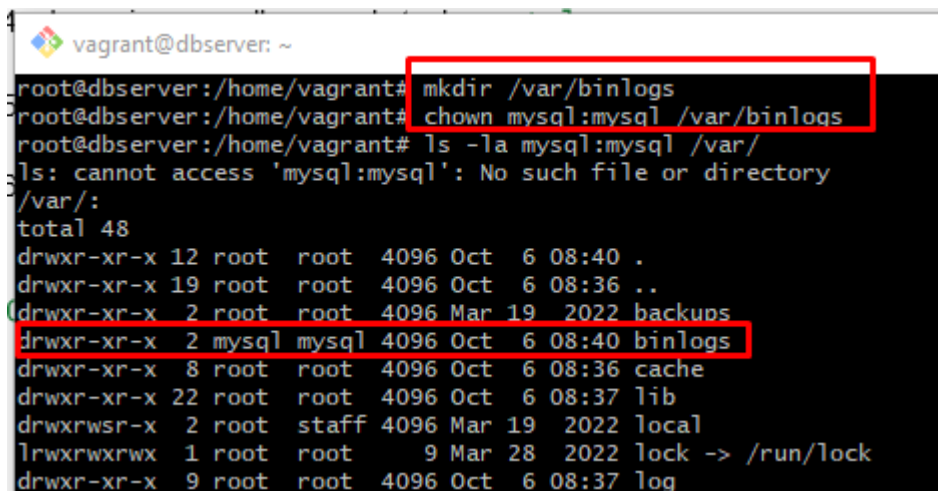
1. Recuperació completa

En aquesta pràctica realitzarem una recuperació completa de totes les dades del servidor MariaDB.

Per aconseguir-ho utilitzarem una còpia completa i la còpia incremental que ens proporcionen els **binary logs**.

1.1. Part 1: Creació del backup

1. Crea el directori **/var/binlogs** i dona-li la propietat a l'usuari i el grup del MariaDB.



```
vagrant@dbserver: ~  
root@dbserver:/home/vagrant# mkdir /var/binlogs  
root@dbserver:/home/vagrant# chown mysql:mysql /var/binlogs  
root@dbserver:/home/vagrant# ls -la mysql:mysql /var/  
ls: cannot access 'mysql:mysql': No such file or directory  
/var/:  
total 48  
drwxr-xr-x 12 root  root  4096 Oct  6 08:40 .  
drwxr-xr-x 19 root  root  4096 Oct  6 08:36 ..  
drwxr-xr-x  2 root  root  4096 Mar 19  2022 backups  
drwxr-xr-x  2 mysql mysql 4096 Oct  6 08:40 binlogs  
drwxr-xr-x  8 root  root  4096 Oct  6 08:36 cache  
drwxr-xr-x 22 root  root  4096 Oct  6 08:37 lib  
drwxrwsr-x  2 root  staff 4096 Mar 19  2022 local  
lrwxrwxrwx  1 root  root    9 Mar 28  2022 lock -> /run/lock  
drwxr-xr-x  9 root  root  4096 Oct  6 08:37 log
```

2. Modifica la configuració del servidor per tal que els registres binaris es guardin al directori que acabes de crear.

vagrant@dbserver: ~

```
GNU nano 5.4 /etc/mysql/mariadb.conf.d/50-server.cnf
#log_slow_verbosity = query_plan,explain
#log-queries-not-using-indexes
#min_examined_row_limit = 1000

# The following can be used as easy to replay backup logs or for replication.
# note: if you are setting up a replication slave, see README.Debian about
# other settings you may need to change.
#server-id = 1
log_bin = /var/binlogs/mysql-bin.log
expire_logs_days = 10
#max_binlog_size = 100M
```

```
root@dbserver:/home/vagrant# systemctl restart mariadb.service
root@dbserver:/home/vagrant#
```

3. Comprova que efectivament els registres binaris s'estan guardant.

```
root@dbserver:/var/binlogs# ls
mysql-bin.000001 mysql-bin.index
root@dbserver:/var/binlogs#
```

4. Insereix un nou lloguer a la taula `rental`.

```
MariaDB [sakila]> insert into rental(rental_date,inventory_id,customer_id,staff_id) VALUES('2023-11-03 08:07:00',2,2,2);
Query OK, 1 row affected (0.372 sec)
```

```
MariaDB [sakila]> select * from rental order by rental_id desc limit 5;
```

rental_id	rental_date	inventory_id	customer_id	return_date	staff_id	last_update
16050	2023-11-03 07:08:44	2	2	NULL	2	2023-11-03 07:08:44
16049	2005-08-23 22:50:12	2666	393	2005-08-30 01:01:12	2	2006-02-15 21:30:53
16048	2005-08-23 22:43:07	2019	103	2005-08-31 21:33:07	1	2006-02-15 21:30:53
16047	2005-08-23 22:42:48	2088	114	2005-08-25 02:48:48	2	2006-02-15 21:30:53
16046	2005-08-23 22:26:47	4364	74	2005-08-27 18:02:47	2	2006-02-15 21:30:53

5 rows in set (0.000 sec)

```
MariaDB [sakila]>
```

5. Crea una còpia de seguretat completa amb `mysqldump`.

```
root@dbserver:/var/binlogs# mysqldump --opt --all-databases > /var/backups/copiaCompleta_mysqldump.sql
root@dbserver:/var/binlogs# ls -la /var/backups/
total 5800
drwxr-xr-x 2 root root 4096 Nov 3 07:11 .
drwxr-xr-x 12 root root 4096 Nov 2 11:13 ..
-rw-r--r-- 1 root root 5930551 Nov 3 07:11 copiaCompleta_mysqldump.sql
root@dbserver:/var/binlogs#
```

6. Insereix un altre lloguer.

```
Database changed
MariaDB [sakila]> insert into rental(rental_date,inventory_id,customer_id,staff_id) VALUES('2023-11-03 08:15:00',2,2,2);
Query OK, 1 row affected (0.002 sec)
MariaDB [sakila]> ;
```

7. Mira els processos que s'estan executant al servidor MariaDB amb l'ordre **SHOW PROCESSLIST**. Hi ha alguna consulta executant-se contra el servidor?

Si, es troba el meu terminal o prompt en execució

```
MariaDB [sakila]> show processlist;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Id | User | Host | db | Command | Time | State | Info | Progress |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 34 | root | localhost | sakila | Query | 0 | starting | show processlist | 0.000 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
1 row in set (0.000 sec)
MariaDB [sakila]> ;
```

Si hi haguessin molts clients executant consultes contra el servidor, caldria esperar que acabessin o eliminar les consultes llargues abans de poder continuar al següent pas.

8. Executa **FLUSH TABLES WITH READ LOCK** per tancar totes les taules i evitar que es puguin modificar.

```
MariaDB [sakila]> FLUSH TABLES WITH READ LOCK;
Query OK, 0 rows affected (0.018 sec)
MariaDB [sakila]> ;
```

9. En un altre terminal fes un arxiu de tot el directori **/var/lib/mysql** anomenat **backup_complet.tar.gz**.

```
vagrant@dbserver: ~
root@dbserver:/var/binlogs# tar -cvzf /var/backups/backup_complet.tar.gz /var/lib/mysql
tar: Removing leading '/' from member names
/var/lib/mysql/
/var/lib/mysql/performance_schema/
/var/lib/mysql/performance_schema/db.opt
/var/lib/mysql/sys/
/var/lib/mysql/sys/x@0024innodb_buffer_stats_by_schema.frm
/var/lib/mysql/sys/x@0024schema_table_statistics.frm
/var/lib/mysql/sys/statements_with_full_table_scans.frm
/var/lib/mysql/sys/x@0024statements_with_full_table_scans.frm
/var/lib/mysql/sys/ps_check_lost_instrumentation.frm
/var/lib/mysql/sys/x@0024wait_classes_global_by_avg_latency.frm
/var/lib/mysql/sys/version.frm
/var/lib/mysql/sys/schema_object_overview.frm
/var/lib/mysql/sys/schema_redundant_indexes.frm
```

10. Assegura't que el registre binari ha acabat d'escriure's (*flush*) i comprova'n l'estat.

```
MariaDB [(none)]> show master status;
```

File	Position	Binlog_Do_DB	Binlog_Ignore_DB
mysql-bin.000002	902		

```
1 row in set (0.000 sec)

MariaDB [(none)]>

MariaDB [(none)]> flush logs;
Query OK, 0 rows affected (0.008 sec)

MariaDB [(none)]>
```

11. Desbloqueja les taules per permetre que els clients tinguin accés complet a la base de dades.

```
MariaDB [(none)]> unlock tables;
Query OK, 0 rows affected (0.000 sec)

MariaDB [(none)]>
```

12. Insereix un nou lloguer.

```
MariaDB [sakila]> insert into rental(rental_date,inventory_id,customer_id,staff_id) VALUES('2023-11-03 08:21:00',2,2,2);
Query OK, 1 row affected (0.002 sec)

MariaDB [sakila]>
```

Amb això hem aconseguit tenir una còpia de totes les dades sensibles del servidor:

- Còpia completa de la BD amb `mysqldump`.
- Còpia incremental dels canvis que s'han fet des de la còpia completa gràcies al registre binari.
- Còpia de tots els fitxers del directori de dades.

2. Part 2: el desastre

En aquest apartat simulem un desastre important: per una banda, algun usuari ha eliminat dades que no s'havien de tocar i, a més, després ha fallat el disc i s'ha perdut tot el contingut del directori de dades.

13. Esborra el contingut de la taula `rental`.

```
MariaDB [sakila]> DELETE FROM rental;
Query OK, 16047 rows affected (0.439 sec)

MariaDB [sakila]> ;
```

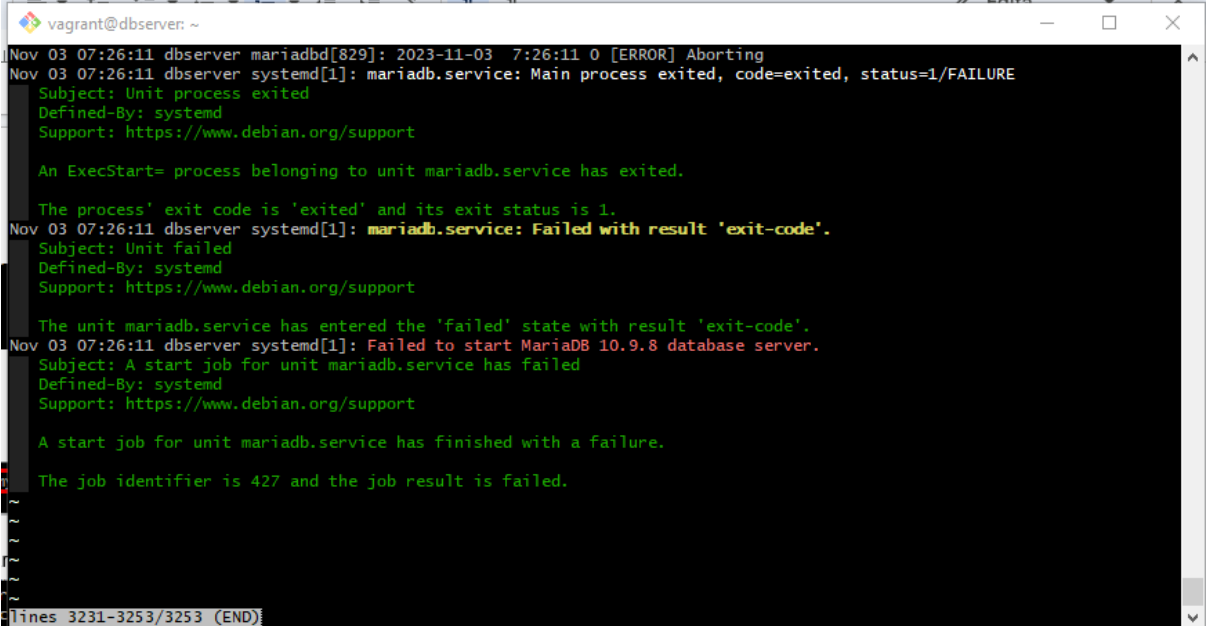
14. Esborra el directori `/var/lib/mysql`.

```
root@dbserver:/var/binlogs# rm -R /var/lib/mysql/
root@dbserver:/var/binlogs# ;
```

15. Reinicia el servidor `mariadb`. Ha pogut arrencar?

```
root@dbserver:/var/binlogs# systemctl restart mariadb.service
Job for mariadb.service failed because the control process exited with error code.
See "systemctl status mariadb.service" and "journalctl -xe" for details.
root@dbserver:/var/binlogs# ;
```

Més detallat amb la comanda `journal -xe`



```
vagrant@dbserver: ~
Nov 03 07:26:11 dbserver mariabdd[829]: 2023-11-03 7:26:11 0 [ERROR] Aborting
Nov 03 07:26:11 dbserver systemd[1]: mariadb.service: Main process exited, code=exited, status=1/FAILURE
Subject: Unit process exited
Defined-By: systemd
Support: https://www.debian.org/support

An ExecStart= process belonging to unit mariadb.service has exited.

The process' exit code is 'exited' and its exit status is 1.
Nov 03 07:26:11 dbserver systemd[1]: mariadb.service: Failed with result 'exit-code'.
Subject: Unit failed
Defined-By: systemd
Support: https://www.debian.org/support

The unit mariadb.service has entered the 'failed' state with result 'exit-code'.
Nov 03 07:26:11 dbserver systemd[1]: Failed to start MariaDB 10.9.8 database server.
Subject: A start job for unit mariadb.service has failed
Defined-By: systemd
Support: https://www.debian.org/support

A start job for unit mariadb.service has finished with a failure.

The job identifier is 427 and the job result is failed.

lines 3231-3253/3253 (END)
```

3. Part 3: restauració

16. Recrea el directori `/var/lib/mysql` i restaura'l a partir de la còpia feta al pas 9. Assegura't que el directori pertany a l'usuari i grup del MariaDB.

```
vagrant@dbserver: ~  
root@dbserver:~# tar -xf /var/backups/backup_complet.tar.gz  
root@dbserver:~# ls  
bin dev home lib32 libx32 media opt root sbin sys usr var  
boot etc lib lib64 lost+found mnt proc run srv tmp vagrant  
root@dbserver:~# cd /var/lib/mysql/  
aria_log.00000001 debian-10.9.flag ibdata1 mysql/ sakila/  
aria_log_control ib_buffer_pool ibtmp1 mysql_upgrade_info sys/  
ddl_recovery.log ib_logfile0 multi-master.info performance_schema/  
root@dbserver:~#
```

17. Desactiva la generació de registres binaris.

```
vagrant@dbserver: ~  
GNU nano 5.4 /etc/mysql/mariadb.conf.d/50-server.cnf *  
# Enable the slow query log to see queries with especially long duration  
#slow_query_log_file = /var/log/mysql/mariadb-slow.log  
#long_query_time = 10  
#log_slow_verbosity = query_plan,explain  
#log-queries-not-using-indexes  
#min_examined_row_limit = 1000  
  
# The following can be used as easy to replay backup logs or for replication.  
# note: if you are setting up a replication slave, see README.Debian about  
# other settings you may need to change.  
#server-id = 1  
#log_bin = /var/binlogs/mysql-bin.log  
#expire_logs_days = 10  
#max_binlog_size = 100M  
  
#  
# * SSL/TLS  
#  
# For documentation, please read  
# https://mariadb.com/kb/en/securing-connections-for-client-and-server/  
#ssl-ca = /etc/mysql/cacert.pem
```

18. Intenta arrencar de nou el servidor. Has pogut?

```
vagrant@dbserver: ~  
root@dbserver:~# systemctl restart mariadb.service  
root@dbserver:~# systemctl status mariadb.service  
● mariadb.service - MariaDB 10.9.8 database server  
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)  
   Drop-In: /etc/systemd/system/mariadb.service.d  
            └─migrated-from-my.cnf-settings.conf  
   Active: active (running) since Fri 2023-11-03 07:35:44 UTC; 5s ago  
     Docs: man:mariadb(8)  
            https://mariadb.com/kb/en/library/systemd/  
   Process: 855 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld (code=exited, status=0/SUCCESS)  
   Process: 858 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= || VAR=cd /usr/bin/..; /usr/bin/ga (code=exited, status=0/SUCCESS)  
   Process: 899 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)  
   Process: 901 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)  
   Main PID: 887 (mariadb)  
    Status: "Taking your SQL requests now..."  
     Tasks: 12 (limit: 528)  
    Memory: 84.3M
```

19. Connecta't al servidor i comprova que les BD s'han restaurat. Quin és l'estat de la taula rental?

```
MariaDB [sakila]> select * from rental order by rental_id desc limit 5;
```

rental_id	rental_date	inventory_id	customer_id	return_date	staff_id	last_update
16051	2023-11-03 07:12:40	2	2	NULL	2	2023-11-03 07:12:40
16050	2023-11-03 07:08:44	2	2	NULL	2	2023-11-03 07:08:44
16049	2005-08-23 22:50:12	2666	393	2005-08-30 01:01:12	2	2006-02-15 21:30:53
16048	2005-08-23 22:43:07	2019	103	2005-08-31 21:33:07	1	2006-02-15 21:30:53
16047	2005-08-23 22:42:48	2088	114	2005-08-25 02:48:48	2	2006-02-15 21:30:53

```
5 rows in set (0.071 sec)

MariaDB [sakila]>
```

20. Esborra la BD **sakila** i restaura-la a partir de la còpia completa feta amb **mysqldump**.

```
MariaDB [sakila]> drop database sakila;
Query OK, 23 rows affected (0.424 sec)

MariaDB [(none)]>
```

```
root@dbserver:/# mysql -u root -p < /var/backups/copiaCompleta_mysqldump.sql
Enter password:
root@dbserver:/# mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 34
Server version: 10.9.8-MariaDB-1:10.9.8+maria-deb11 mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> use sakila;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [sakila]>
```

21. Mira els últims registres de la taula **rental**. Hi ha tots els registres que has creat anteriorment?

No, falten registres.

```
Database changed
MariaDB [sakila]> select * from rental order by rental_id desc limit 5;
```

rental_id	rental_date	inventory_id	customer_id	return_date	staff_id	last_update
16050	2023-11-03 07:08:44	2	2	NULL	2	2023-11-03 07:08:44
16049	2005-08-23 22:50:12	2666	393	2005-08-30 01:01:12	2	2006-02-15 21:30:53
16048	2005-08-23 22:43:07	2019	103	2005-08-31 21:33:07	1	2006-02-15 21:30:53
16047	2005-08-23 22:42:48	2088	114	2005-08-25 02:48:48	2	2006-02-15 21:30:53
16046	2005-08-23 22:26:47	4364	74	2005-08-27 18:02:47	2	2006-02-15 21:30:53

```
5 rows in set (0.000 sec)

MariaDB [sakila]>
```

22. En un altre terminal, mira els continguts del directori **/var/binlogs**. Quin **binlog** ha començat després que es fes la còpia de seguretat completa?

```

root@dbserver:~# ls -la /var/binlogs/
total 28
drwxr-xr-x  2 mysql mysql 4096 Nov  3 07:31 .
drwxr-xr-x 12 root  root 4096 Nov  2 11:13 ..
-rw-rw----  1 mysql mysql  351 Nov  2 12:14 mysql-bin.000001
-rw-rw----  1 mysql mysql  949 Nov  3 07:17 mysql-bin.000002
-rw-rw----  1 mysql mysql  855 Nov  3 07:26 mysql-bin.000003
-rw-rw----  1 mysql mysql   90 Nov  3 07:17 mysql-bin.index
-rw-rw----  1 mysql mysql   6 Nov  3 07:26 mysql-bin.state
root@dbserver:~#

```

23. Començant amb el registre que s'ha començat després de la còpia de seguretat completa, mira els registres de cada *binlog* per localitzar on comença l'eliminació de la taula *rental*. Quin *binlog* conté l'eliminació de *rental*? Quin és l'últim *end_log_pos* abans que comenci l'eliminació?

```

root@dbserver:~# mysqlbinlog /var/binlogs/mysql-bin.000003 --verbose --base64-output=DECODE-ROWS | grep 'DELETE FROM rental'
DELETE FROM rental
root@dbserver:~#

```

```

vagrant@dbserver: ~
SET @@session.time_zone='SYSTEM'/*!*/;
SET @@session.local_time_names=0/*!*/;
SET @@session.collation_database=DEFAULT/*!*/;
insert into rental(rental_date,inventory_id,customer_id,staff_id) VALUES('2023-11-03 08:24:13',1,1,1)
/*!*/;
# at 641
#231103  7:20:58 server id 1  end_log_pos 672 CRC32 0xf2eb1f0b  Xid = 991
COMMIT/*!*/;
# at 672
#231103  7:24:13 server id 1  end_log_pos 714 CRC32 0x1cb6d86b  GTID 0-1-4 trans
/*!100001 SET @@session.gtid_seq_no=4/*!*/;
START TRANSACTION
/*!*/;
# at 714
#231103  7:24:13 server id 1  end_log_pos 801 CRC32 0x09ec9505  Query   thread_id=35
id=0
SET TIMESTAMP=1698996253/*!*/;
DELETE FROM rental
/*!*/;
# at 801
#231103  7:24:13 server id 1  end_log_pos 832 CRC32 0xe600b029  Xid = 994
COMMIT/*!*/;
# at 832
#231103  7:26:11 server id 1  end_log_pos 855 CRC32 0x715db386  Stop
DELIMITER ;
# End of log file
ROLLBACK /* added by mysqlbinlog */;
/*!50003 SET COMPLETION_TYPE=@OLD_COMPLETION_TYPE*/;
/*!50530 SET @@SESSION.PSEUDO_SLAVE_MODE=0*/;
root@dbserver:~#

```

24. Utilitzant les dades registrades als passos anteriors i l'ordre *mysqlbinlog*, crea i executa un *script* SQL que restaura la base de dades *sakila* just al punt anterior de l'eliminació de *rental*.


```
root@dbserver:/home/vagrant# mysql -u root -p --binary-mode -o < /var/binlogs/mysql-bin.000002
Enter password:
root@dbserver:/home/vagrant# mysql
```

25. Mira els últims registres de la taula `rental`. Hi ha els registres que havies creat anteriorment?

```
you can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [sakila]> select * from rental order by rental_id desc limit 5;
+-----+-----+-----+-----+-----+-----+-----+
| rental_id | rental_date       | inventory_id | customer_id | return_date       | staff_id | last_update       |
+-----+-----+-----+-----+-----+-----+-----+
| 16050 | 2023-11-03 07:08:44 | 2           | 2           | NULL              | 2        | 2023-11-03 07:08:44 |
| 16049 | 2005-08-23 22:50:12 | 2666        | 393         | 2005-08-30 01:01:12 | 2        | 2006-02-15 21:30:53 |
| 16048 | 2005-08-23 22:43:07 | 2019        | 103         | 2005-08-31 21:33:07 | 1        | 2006-02-15 21:30:53 |
| 16047 | 2005-08-23 22:42:48 | 2088        | 114         | 2005-08-25 02:48:48 | 2        | 2006-02-15 21:30:53 |
| 16046 | 2005-08-23 22:26:47 | 4364        | 74          | 2005-08-27 18:02:47 | 2        | 2006-02-15 21:30:53 |
+-----+-----+-----+-----+-----+-----+-----+
5 rows in set (0.000 sec)

MariaDB [sakila]>
```