Technical Guide



GUIDE #7: When Disaster Strikes: How Does EZSTACKR and Gluster FS Recover?

Introduction:

A storage mirror is a complete backup of the data that can be used if the primary data store fails. Storage mirroring facilitates high availability of data systems and the applications that use them. In this guide, a Gluster mirror node and the MYSQL service is "destroyed". Another Gluster mirror node survives. MYSQL service is down. When MYSQL service is restored, it relies on the surviving Gluster mirror node. MYSQL operations e.g. SQL inserts start up again. As SQL operations continue, the "destroyed" node is restored, it rejoins the Gluster cluster. Data is resynced. MYSQL operations continue as usual.

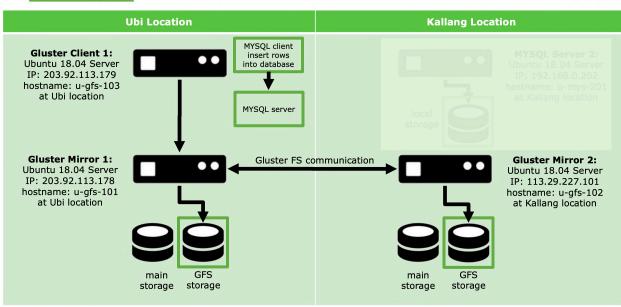
Storage Mirror Scenario Summary Part 2 (details in the next Technical guide):

In storage mirror scenario part 2, MYSQL is introduced into the Gluster mirror cluster.

- 1. Setting up the Gluster mirror cluster for MYSQL data store
- 2. Installing MYSQL server
- 3. Creating MYSQL user, database, tables and scripts
- 4. Inserting data into MYSQL
- 5. Verifying the integrity of the MYSQL data written to Gluster storage mirror pool
- 6. Destroying MYSQL server and destroying first Gluster node
- 7. Restoring MYSQL data from second Gluster node
- 8. Observing first Gluster node when it is repaired and rejoins the Gluster cluster

A Mirroring Scenario on Ezstackr with MYSQL



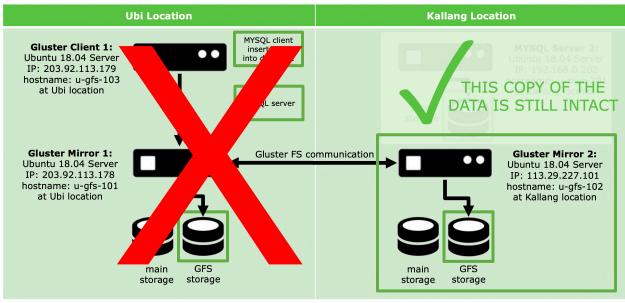


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Recovery Scenario when Ubi Location is Destroyed



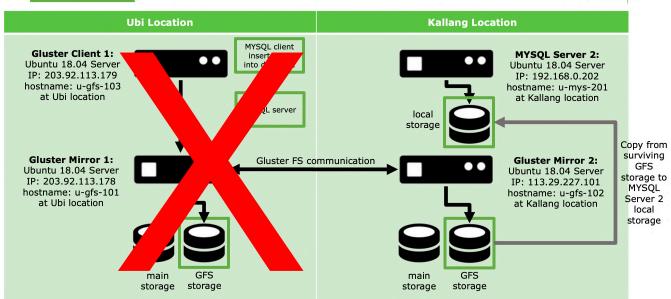


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Copy MYSQL Data Out from Mirror and Start New MYSQL LC



SETTING UP THE GLUSTER MIRROR CLUSTER FOR MYSQL DATA STORE

In technical guide 6, the Gluster mirror was set up. No changes need to be made at the Gluster server mirror. Let's review some of the commands needed to set up the Gluster mirror:

gluster peer probe u-gfs-102

gluster peer status

gluster pool list

gluster volume create volume1 replica 2 u-gfs-101:/gluster-storage u-gfs-102:/gluster-storage force gluster volume start volume1

sudo gluster volume status

INSTALLING MYSQL SERVER

Choosing u-gfs-103 to install the MYSQL server and reviewing the file system:

df -H

Unmounting any Gluster file system from previous tech guide setup:

sudo umount /storage-pool

Making MYSQL DATA directory:

Typically, MYSQL stores its data and configuration files at /var/lib/mysql and creates this directory during installation. In this case, let's create this directory and mount it to Gluster before MYSQL installation begins. sudo mkdir /var/lib/mysql

Mount the Gluster volume:

sudo mount -t glusterfs u-gfs-101:volume1 /var/lib/mysql

Checking storage size of mountpoint:

df -H

Testing /var/lib/mysql by adding a file to it:

sudo ls -R / >> /var/lib/mysql/file01

```
▲ Not Secure | 203.92.113.180/noVNC/vnc.php?host=203.92.113.181&port=3438&vmname=u-gfs-103
                                                                                                                 ubuntu@u–gfs–103:~$ sudo mkdir /var/lib/mysql
[sudo] password for ubuntu:
ubuntu@u–gfs–103:~$ ls –l /var/lib/mysql
total 0
ubuntu@u–gfs–103:~$ sudo mount –t glusterfs u–gfs–101:volume1 /var/lib/mysql
ubuntu@u–gfs–103:~$ df –H
Filesystem Size Used Avail Use% Mounted on
udev
                                                                                                                   Duntu@u_gfs-103:~$ cd /var/lib/mysql
buntu@u_gfs-103:~$ cd /var/lib/mysql
buntu@u_gfs-103:/var/lib/mysql$ ls -1
otal 32:17
-vw-rw-r- 1 ubuntu ubuntu 3293726 Sep 19 14:21 file01
ibuntu@u-gfs-103:/var/lib/mysql$ rm file01
ibuntu@u-gfs-103:/var/lib/mysql$ cd
ubuntu@u-gfs-103:~$ _
```

Installing MYSQL:

sudo apt update

sudo apt install mysql-server

sudo mysql_secure_installation

```
Unpacking liblwp-mediatypes-perl (6.02-1) ...

Selecting previously unselected package libhttp-message-perl.

Preparing to unpack .../13-libhttp-message-perl.6.14-1_all.deb ...

Unpacking libhttp-message-perl (6.14-1) ...

Selecting previously unselected package mysql-server.

Preparing to unpack .../14-mysql-server_5.7.31-Oubuntu0.18.04.1_all.deb ...

Unpacking mysql-server (5.7.3i-Oubuntu0.18.04.1) ...

Setting up libhtml-tagset-perl (3.20-3) ...

Setting up libevent-core-2.1-6.amd64 (2.1.8-stable-4build1) ...

Setting up mysql-server-core-5.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up mysql-server-core-5.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up mysql-server-core-5.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up libhup-mediatypes-perl (6.02-1) ...

Setting up libhup-mediatypes-perl (6.02-1) ...

Setting up libhtml-parser-perl (3.72-sbuild1) ...

Setting up libhtml-parser-perl (6.02-1) ...

Setting up mysql-client-core-5.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up libhtml-template-perl (2.97-1) ...

Setting up libhtml-template-perl (2.97-1) ...

Setting up libhtml-template-perl (2.97-1) ...

Setting up libhtml-template-perl (3.73-1) ...

Setting up mysql-client-5.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up mysql-server-5.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up mysql-server-6.7 (5.7.31-Oubuntu0.18.04.1) ...

Setting up mysql-server (5.7.31-Oubuntu0.18.04.1) ...

Setting up mysql-server (5.7.31-Oubuntu0.18.04.1) ...

Processing triggers for systemd/system/multi-user.target.wants/mysql.service - /lib/systemd/system/mysql.service ...

Processing triggers for systemd (237-Subuntu0.1) ...

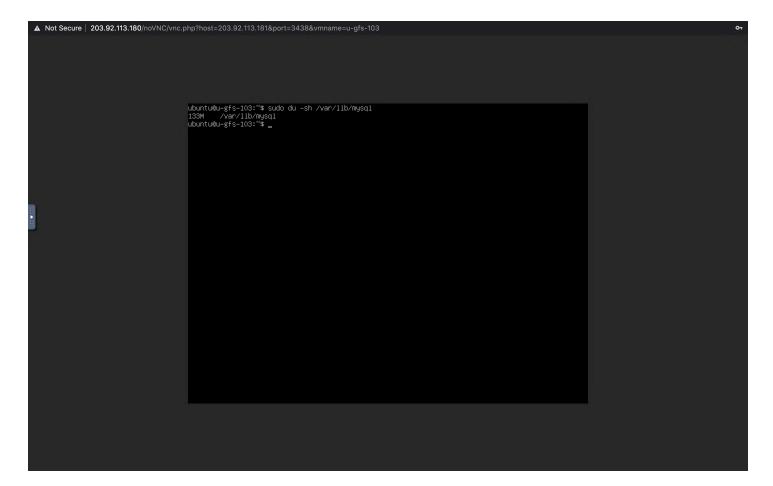
Processing triggers for systemd (237-Subuntu0.1) ...

Processing triggers for man-db (2.8.3-2ubuntu0.1) ...

Processing triggers for useadhead (0.100.0-21) ...

ubuntu@u-gfs-103:**
```

About 130MB of MYSQL files were installed into /var/lib/mysql:



Checking MYSQL status:

sudo service mysql status sudo mysqladmin -p -u root version

CREATING MYSQL USER, DATABASE, TABLES AND SCRIPTS Running MYSQL commands to check database:

sudo mysql

Creating MYSQL user:

sudo mysql

 ${\it CREATE~USER~'ubuntu'~IDENTIFIED~BY~'ubuntu';}$

GRANT ALL PRIVILEGES ON *.* TO 'ubuntu' WITH GRANT OPTION;

Check status of storage available and status of /var/lib/mysql

df -H

du -sh /var/lib/mysql

sudo ls -l /var/lib/mysql

sudo ls -l /var/lib/mysql/personmaster

Logging in as MYSQL user:

mysql -u ubuntu -pubuntu

CREATE DATABASE personmaster;

USE personmaster;

CREATE TABLE personinfo (passport varchar(20), fullname varchar(20), sex varchar(1), birthdate varchar(10)); quit;

Checking status of storage available and status of /var/lib/mysql

df -H

Checking files created by MYSQL:

sudo ls -l /var/lib/mysql

sudo ls -l /var/lib/mysql/personmaster

 $[a\ small\ file\ of\ about\ 100K\ called\ personinfo. ibd\ is\ created\ in\ /var/lib/mysql/personmaster]$

INSERTING DATA INTO MYSQL

Creating a Unix script "insertmysql.sh" that calls MYSQL to insert records:

```
RANDOM=$$
for i in `seq 100000`
  rm insert.mysql
  echo use personmaster";" >> insert.mysql
  TMP1=$RANDOM
  TMP2=$RANDOM
  PASSPORT=P$TMP1$TMP2
  FULLNAME=$(cat /dev/urandom|tr -dc 'a-zA-Z0-9'|fold -w 18| head -n 1)
  SEX=M
  DIFFYEAR=$((1999-1930+1))
  FINALYEAR=$(($(($RANDOM%$DIFFYEAR))+1930))
  DIFFMTH=$((12-1+1))
  FINALMTH=$(($(($RANDOM%$DIFFMTH))+1))
  DIFFDAY = \$((30-1+1))
  FINALDAY=$(($(($RANDOM%$DIFFDAY))+1))
  BIRTHDATE=$FINALYEAR"-"$FINALMTH"-"$FINALDAY
```

```
echo insert into personinfo "("passport, fullname, sex, birthdate")"
values "(""'"$PASSPORT"'", "'"$FULLNAME"'", "'"$SEX"'",
"'"$BIRTHDATE"'"")"";" >> insert.mysql
  TMP1=$RANDOM
  TMP2=$RANDOM
  PASSPORT=P$TMP1$TMP2
  FULLNAME=$(cat /dev/urandom|tr -dc 'a-zA-Z0-9'|fold -w 18| head -n 1)
  SEX=F
  DIFFYEAR=$((1999-1930+1))
  FINALYEAR=$(($(($RANDOM%$DIFFYEAR))+1930))
  DIFFMTH=\$((12-1+1))
  FINALMTH=$(($(($RANDOM%$DIFFMTH))+1))
  DIFFDAY = \$((30-1+1))
  FINALDAY=$(($(($RANDOM%$DIFFDAY))+1))
  BIRTHDATE=$FINALYEAR"-"$FINALMTH"-"$FINALDAY
  echo $PASSPORT $FULLNAME $SEX $BIRTHDATE
  echo insert into personinfo "("passport, fullname, sex, birthdate")"
values "(""'"$PASSPORT"'", "'"$FULLNAME"'", "'"$SEX"'",
"'"$BIRTHDATE"'"")"";" >> insert.mysql
  echo "quit" >> insert.mysql
 mysql -u ubuntu -pubuntu < insert.mysql
  sleep 0
done
```

Running Unix script "insertmysql.sh" that calls MYSQL to insert records:

./insertmysql.sh

```
[because MYSQL is launched with stdin from a file containing SQL statements, there is a warning message]
         ▲ Not Secure | 203.92.113.180/noVNC/vnc.php?host=203.92.113.181&port=3438&vmname=u-gfs-103
                                                                                                                                                                                                                                                Ubuntu@u-gfs-103:% ./insertmysql.sh
P231705893 V1QljFJt9nVDUPAHHq M 1965-1-1
P278904727 Y05KbwzM82JLdSNNhG F 1981-7-20
mysql: [Warning] Using a password on the command line interface can be insecure.
P353415135 qNNt5Epr60d22PUXcU M 1964-8-18
P573527844 8RNz5j0g4nVcX2Pmz F 1981-9-16
mysql: [Warning] Using a password on the command line interface can be insecure.
P100806119 2JJNi5hqruwelJCRjd M 1944-9-27
P2162011486 NNRNb2yVfsu8bDz2bD F 1981-5-10
mysql: [Warning] Using a password on the command line interface can be insecure.
P1118824689 jdJdcSMKLKtKtoGgWH M 1969-2-4
P273095454 ZTnzTtHhDPKcYlAsCs F 1995-6-30
mysql: [Warning] Using a password on the command line interface can be insecure.
P3040225331 qU0jg0mYMONkYYoKV M 1954-8-5
P1600518274 B16ccpMcEQv4b6jtv F 1933-2-16
mysql: [Warning] Using a password on the command line interface can be insecure.
P217552229 Mgxy3gpHcAtOn8BKc2 M 1949-6-17
P3159325855 heRikAnM3l0yY1fkf F 1965-8-18
mysql: [Warning] Using a password on the command line interface can be insecure.
P30794 jyvuXhBrikZ2cRumab M 1983-6-21
P204041869 EGryUWPLEbK010ep12 F 1933-5-5
mysql: [Warning] Using a password on the command line interface can be insecure.
P30932521 1GSRCGKGNSPYCI5yKk M 1950-6-3
P328829973 z]PA4wYupdgRjtDALe F 1990-1-5
mysql: [Warning] Using a password on the command line interface can be insecure.
P131120252 F6Ht23VAC78/fbbKx M 1938-6-28
P2816722107 301iEr81fFhPpyk7F F 1997-10-18
mysql: [Warning] Using a password on the command line interface can be insecure.
P1411312743 Jk1BOCK1BYDPSTEZKQ M 1997-7-12
P929215565 ihn730Um0ugMSpOxrr F 1973-10-10
mysql: [Warning] Using a password on the command line interface can be insecure.
P1411312743 Jk1BOCK1BYDPSTEZKQ M 1997-7-12
P929215565 ihn730Um0ugMSpOxrr F 1973-10-10
mysql: [Warning] Using a password on the command line interface can be insecure.
P1411312743 Jk1BOCK1BYDPSTEZKQ M 1997-7-12
P929215565 ihn730Um0ugMSpOxrr F 1973-10-10
```

Verifying data is inserted into MYSQL:

mysql -u ubuntu -pubuntu USE personmaster;

```
SELECT * from personinfo;
 ▲ Not Secure | 203.92.113.180/noVNC/vnc.php?host=203.92.113.181&port=3438&vmname=u-gfs-103
```

Check status of storage available and status of /var/lib/mysql

df -H sudo ls -l /var/lib/mysql sudo ls -l /var/lib/mysql/personmaster [the file personinfo.ibd grows rapidly in /var/lib/mysql/personmaster]

```
▲ Not Secure | 203.92.113.180/noVNC/vnc.php?host=203.92.113.181&port=3437&vmname=u-gfs-101
```

Reviewing important SQL statements:

mysql -u ubuntu -pubuntu USE personmaster; INSERT INTO personinfo (passport, fullname, sex, birthdate) values ('1', '1', '1', '1'); SELECT * from personinfo; DELETE from personinfo;

Reviewing important MYSQL statements:

Starting MYSQL:

sudo service mysql start sudo service mysql status

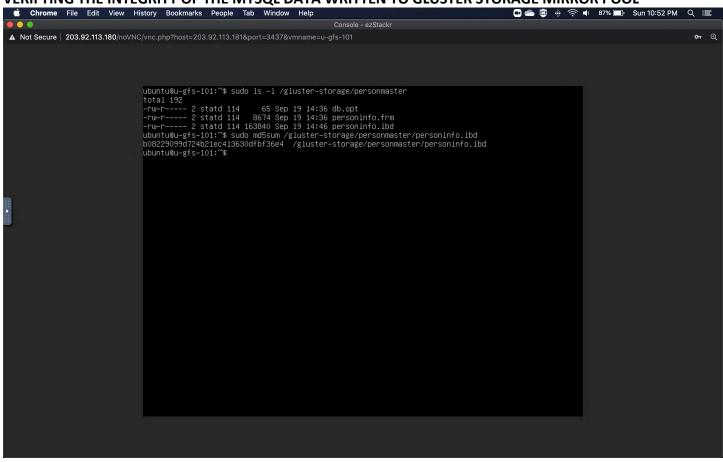
Stopping MYSQL:

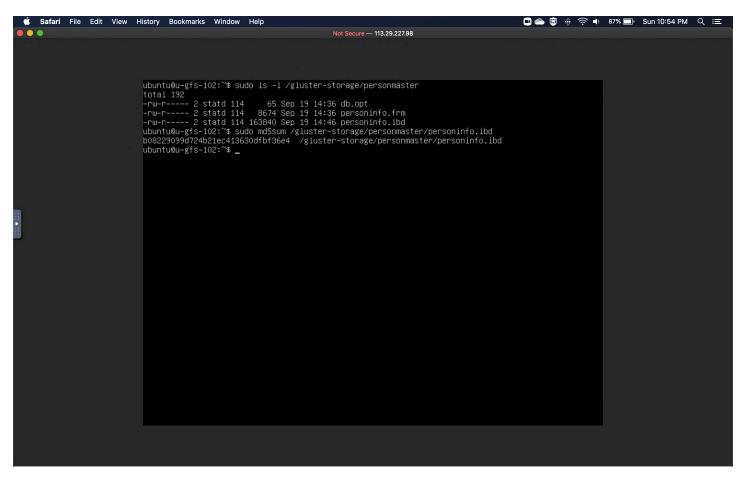
sudo service mysql stop sudo service mysql status

Reviewing important GLUSTER / MYSQL interactions:

Should you shutdown u-gfs-103, u-gfs-101 and u-gfs102 and start them up again, is important to start up ugfs-101 and u-gfs-102 first, wait for Gluster to complete startup before starting u-gfs-103. When u-gfs-103 starts, you might need to remount /var/lib/mysql, and start MYSQL

VERIFYING THE INTEGRITY OF THE MYSQL DATA WRITTEN TO GLUSTER STORAGE MIRROR POOL

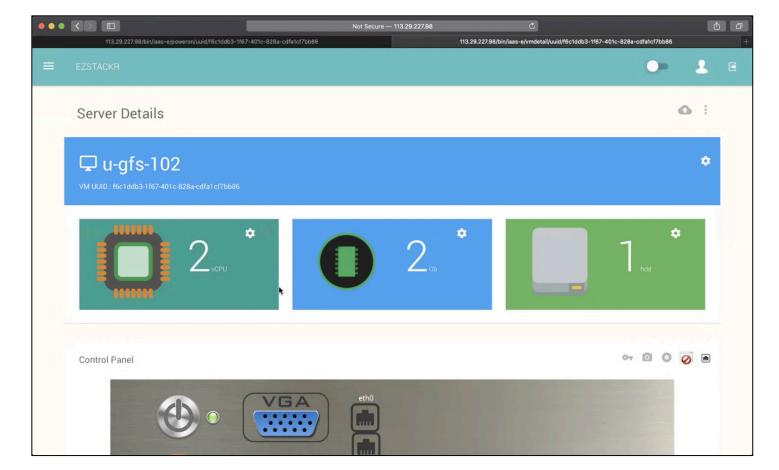




DESTROYING MYSQL SERVER AND DESTROYING FIRST GLUSTER NODE

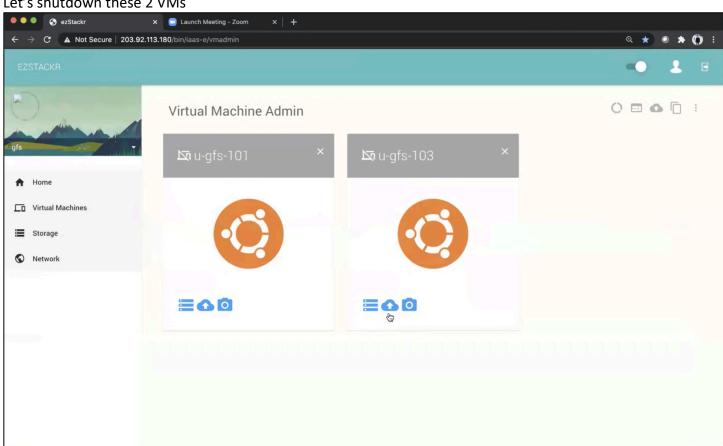
Review u-gfs-102:

Let's keep this VM alive



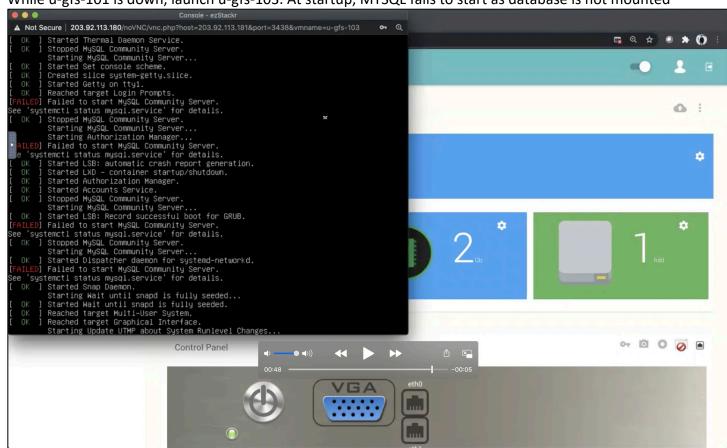
Review u-gfs-101, u-gfs-103:

Let's shutdown these 2 VMs



RESTORING MYSQL DATA FROM SECOND GLUSTER NODE Review u-gfs-103:

While u-gfs-101 is down, launch u-gfs-103. At startup, MYSQL fails to start as database is not mounted



Mount the Gluster volume on u-gfs-102 (this is the surviving Gluster node):

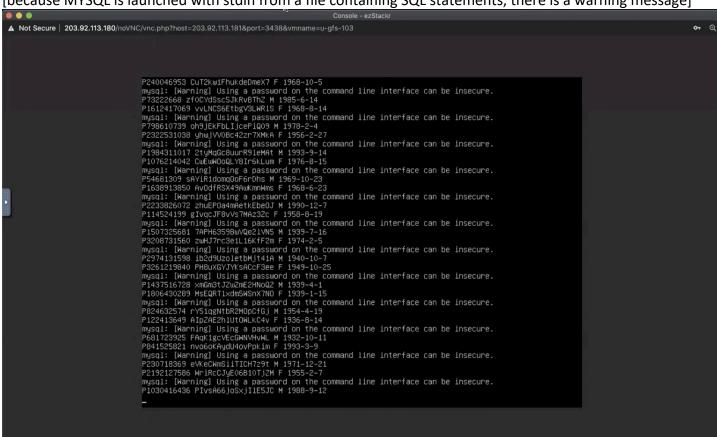
sudo mount -t glusterfs u-gfs-102:volume1 /var/lib/mysql

Starting MYSQL:

sudo service mysql start sudo service mysql status

Running Unix script "insertmysql.sh" that calls MYSQL to insert records (records inserted into u-gfs-102): ./insertmysql.sh

[because MYSQL is launched with stdin from a file containing SQL statements, there is a warning message]



OBSERVING FIRST GLUSTER NODE AFTER IT IS REPAIRED AND REJOINS GLUSTER CLUSTER Relaunching u-gfs-101 (this Gluster mirror node will rejoin the cluster when server is up):

Logging into u-gfs-101

A Moi Secure | 203.92.113.180/moi/NC/mc.php?host=203.92.113.1818.port=3437.8vmnume=u-gfs=101

Dutuntu 18.04.5 LTS U-gfs=101 Ityul

-sfs=101 login: ubuntu

-ssawords
-usst login: Sun Sep. 20.92.148.53 +08 2020 on tyul
-electione to luburutu 18.04.5 It (SINUX_Inux_4.15.0-117-generic x86_54)

-locumentation: https://blip.ubuntu.com/
-locumentation: https://blip.ubuntu.com/
-ssupports: https://blip.ubuntu.com/
-ssupports: https://blip.ubuntu.com/
-studentess.io/ has docs and details.

18 pockages can be updated.
- updates are security updates.

- ubuntu@u-gfs=101:"s

- Control Panel

Reviewing u-gfs-101 after it has restarted (MYSQL database personinfo.ibd has been updated):

Reviewing u-gfs-102 (MYSQL database personinfo.ibd has also been updated):

Is -I /gluster-storage/personmaster

```
Not Secure — 113.29.227.98
ubuntu@u-gfs-102:~$ sudo ls -1 /gluster-storage/personmaster total 304
 total 304

-rw-r----- 2 statd 114 65 Sep 19 14:36 db.opt

-rw-r----- 2 statd 114 8674 Sep 19 14:36 personinfo.frm

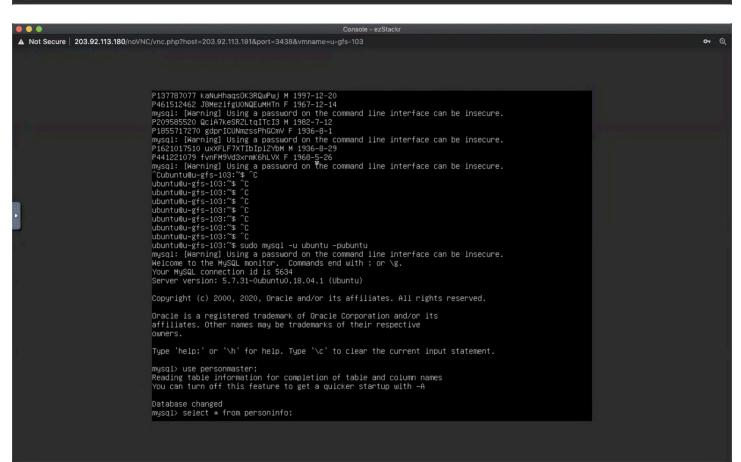
-rw-r----- 2 statd 114 278528 Sep 20 23:13 personinfo.ibd

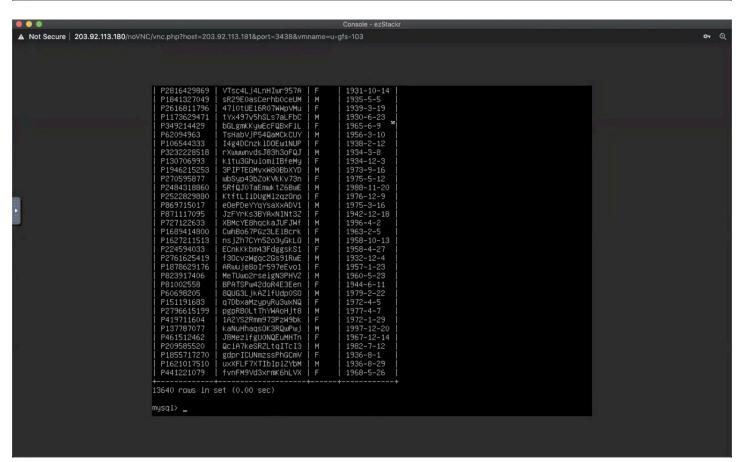
ubuntu@u-gfs-102:~$ sudo 1s -1 /gluster-storage/personmaster
total 304
ubuntu@u-gfs-102: $ sudo 1s -1 /gluster storage/person
total 336
-rw-r----- 2 statd 114 65 Sep 19 14:36 db.opt
-rw-r----- 2 statd 114 8674 Sep 19 14:36 personinfo.frm
-rw-r----- 2 statd 114 311296 Sep 21 01:04 personinfo.ibd
ubuntu@u-gfs-102: $ sudo 1s -1 /gluster-storage/personmaster
total 9248
-rw-r----- 2 statd 114 65 Sep 19 14:36 db.opt
-rw-r---- 2 statd 114 8674 Sep 19 14:36 personinfo.frm
-rw-r---- 2 statd 114 9437184 Sep 21 01:08 personinfo.ibd
ubuntu@u-gfs-102: ~$
```

Stopping database inserts and logging into MYSQL to review the data in database:

Ctrl^C to stop the SQL script

```
▲ Not Secure | 203.92.113.180/noVNC/vnc.php?host=203.92.113.181&port=3438&vmname=u-gfs-103
                                                                                                                                                                                                                                                                                                                                                                                                mysql: [Marning] Using a password on the command line interface can be insecure. P727122633 XBMCYE8hqckaJUFJHF M 1996-4-2 P1689414800 CwhBo67PGz3LEIBCrk F 1963-2-5 mysql: [Marning] Using a password on the command line interface can be insecure. P1627211513 ns;lZh7CynS203yGkLO M 1958-10-13 P224594033 ECnkKkbm43FdggskS1 F 1958-4-27 mysql: [Marning] Using a password on the command line interface can be insecure. P2761625419 f30cvzMgqc2Gs918UE M 1932-12-4 P1878629176 ARwuje80Ir597eEvo1 F 1957±1-23 mysql: [Marning] Using a password on the command line interface can be insecure. P823917406 MeTUwo2rseigN39HVZ M 1960-5-23 P81002558 BPATSFw42doR4E3Een F 1944-6-11 mysql: [Marning] Using a password on the command line interface can be insecure. P60698205 8QUG3LjkA21fUdpOSO M 1979-2-22 P15191683 q70bxaMzypyRu3uxNQ F 1972-4-5 mysql: [Marning] Using a password on the command line interface can be insecure. P2796615199 pggR80LtThYMA0Hjt8 M 1977-4-7 mysql: [Marning] Using a password on the command line interface can be insecure. P13778707 kaNuHhaqsUKSRQuFwj M 1997-12-20 mysql: [Marning] Using a password on the command line interface can be insecure. P137787077 kaNuHhaqsUKSRQuFwj M 1997-12-14 mysql: [Marning] Using a password on the command line interface can be insecure. P209585520 Qcih7keSRZltqITc13 M 1982-7-12 mysql: [Marning] Using a password on the command line interface can be insecure. P185717270 gdorlCUNNZSSPNGDW F 1936-8-29 mysql: [Marning] Using a password on the command line interface can be insecure. P1621017510 uxFLF7XT1b1p12YbM M 1936-8-29 mysql: [Marning] Using a password on the command line interface can be insecure. P1621017510 mysFMyd3xrmK6hLV F 1968-5-26 mysql: [Marning] Using a password on the command line interface can be insecure. P1621017510 mysFMyd3xrmK6hLV F 1968-5-26 mysql: [Marning] Using a password on the command line interface can be insecure. P1621017510 mysFMyd3xrmK6hLV F 1968-5-26 ubuntu@u-gfs-103:7% ^C ubuntu@u-gfs-103:7% ^C ubuntu@u-gfs-103:7% ^C ubuntu@u-gfs-103:7% ^C ubuntu@u-gfs-103:7% ^C ub
```





END OF TEST

This concludes a successful storage mirror test.

Contact Us

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