AWS-Based Multi-Server Architecture Implementation

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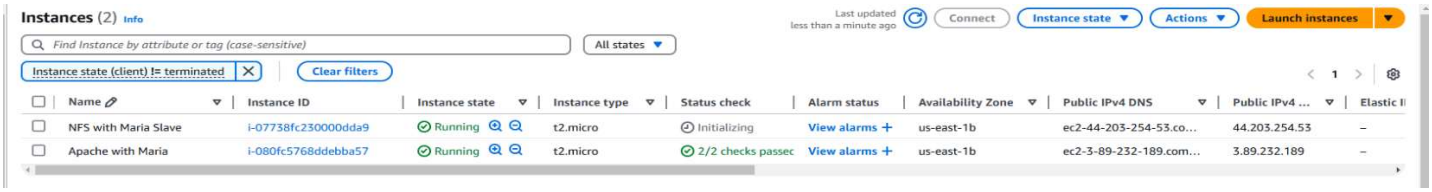
Batch – TR3

Instances

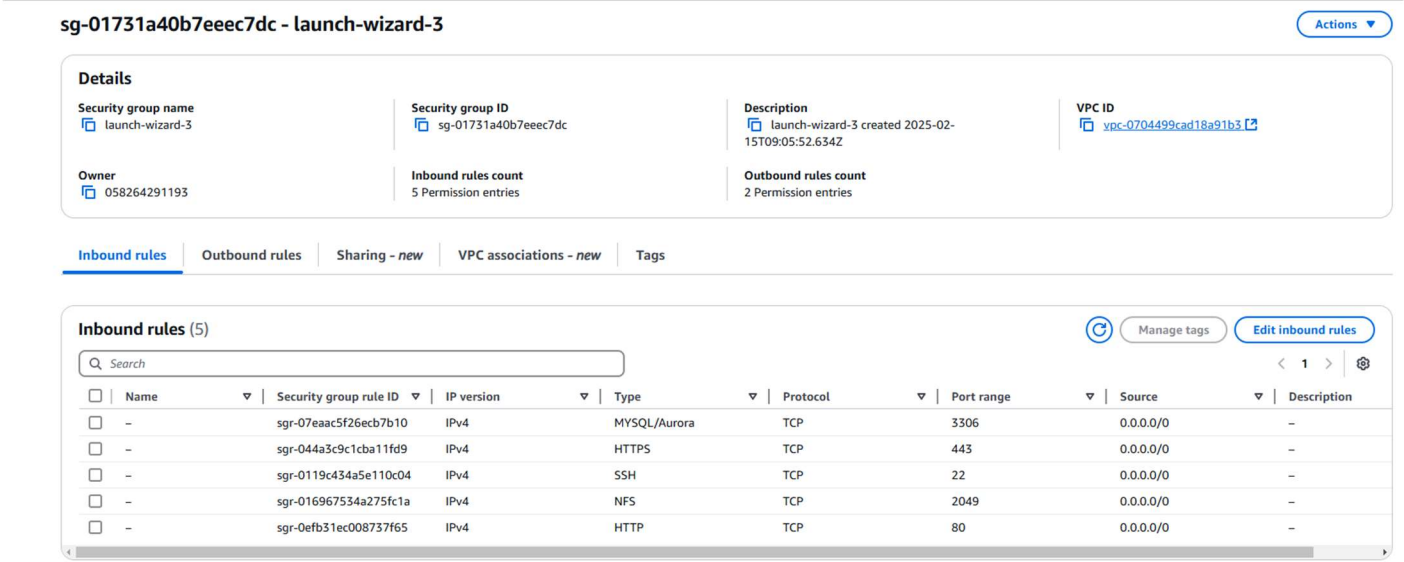
1. **Instance 1 (44.203.254.53)** - NFS Server & MariaDB Slave
2. **Instance 2 (3.89.232.189)** - Web Server & MariaDB Slave



AWS Infrastructure

1. Security Group

- Allow SSH (22).
- Allow HTTP (80) & HTTPS (443)
- Allow MySQL (3306)
- Allow NFS (2049)



Implementation Steps

Configure Instance 1 (NFS + MariaDB Slave)

1. Setup NFS Server

sudo apt update && sudo apt install -y nfs-kernel-server
sudo mkdir -p /nfs/wp-data /nfs/db-data
sudo chown -R nobody:nogroup /nfs/wp-data /nfs/db-data

Configure exports:

echo "/nfs/wp-data 3.89.232.189(rw,sync,no_root_squash)" | sudo tee -a /etc/exports
echo "/nfs/db-data 3.89.232.189(rw,sync,no_root_squash)" | sudo tee -a /etc/exports

```
ubuntu@ip-172-31-89-204:~$ echo "/nfs/wp-data 3.89.232.189(rw,sync,no_root_squash)" | sudo tee -a /etc/exports
echo "/nfs/db-data 3.89.232.189(rw,sync,no_root_squash)" | sudo tee -a /etc/exports
/nfs/wp-data 3.89.232.189(rw,sync,no_root_squash)
/nfs/db-data 3.89.232.189(rw,sync,no_root_squash)
ubuntu@ip-172-31-89-204:~$
```

sudo exportfs -a
sudo systemctl restart nfs-kernel-server

```
ubuntu@ip-172-31-89-204:~$ sudo exportfs -a
sudo systemctl restart nfs-kernel-server
exportfs: /etc/exports [1]: Neither 'subtree_check' or 'no_subtree_check' specified for export "3.89.232.189:/nfs/wp-data".
  Assuming default behaviour ('no_subtree_check').
  NOTE: this default has changed since nfs-utils version 1.0.x

exportfs: /etc/exports [2]: Neither 'subtree_check' or 'no_subtree_check' specified for export "3.89.232.189:/nfs/db-data".
  Assuming default behaviour ('no_subtree_check').
  NOTE: this default has changed since nfs-utils version 1.0.x

ubuntu@ip-172-31-89-204:~$
```

2. Setup MariaDB Slave

sudo apt install -y mariadb-server
sudo nano /etc/mysql/mariadb.conf.d/50-server.cnf

Modify configuration:

[mysqld]
server-id = 2
relay-log = /var/log/mysql/mysql-relay-bin.log

```
# this is only for the mysqld standalone daemon
[mysqld]

#
# * Basic Settings
#

server-id = 2
relay-log = /var/log/mysql/mysql-relay-bin.log
```

Restart MariaDB:

sudo systemctl restart mariadb

```
ubuntu@ip-172-31-89-204:~$ sudo systemctl restart mariadb
ubuntu@ip-172-31-89-204:~$ sudo systemctl enable mariadb
Synchronizing state of mariadb.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable mariadb
ubuntu@ip-172-31-89-204:~$ sudo systemctl start mariadb
ubuntu@ip-172-31-89-204:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.11.8 database server
     Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; preset: enabled)
     Active: active (running) since Mon 2025-02-24 08:49:13 UTC; 30s ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
   Main PID: 11516 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 12 (limit: 7463)
     Memory: 78.7M (peak: 81.6M)
        CPU: 364ms
     CGroup: /system.slice/mariadb.service
             └─11516 /usr/sbin/mariadbd

Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Note] InnoDB: log sequence number 46980; transaction id 14
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Note] InnoDB: Loading buffer pool(s) from /var/lib/mysql/ib_buffer_pool
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Note] Plugin 'FEEDBACK' is disabled.
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Warning] You need to use --log-bin to make --expire-logs-days or --binlog-expire-logs-seconds work.
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Note] Server socket created on IP: '127.0.0.1'.
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Note] /usr/sbin/mariadbd: ready for connections.
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: Version: '10.11.8-MariaDB-0ubuntu0.24.04.1'  socket: '/run/mysqld/mysqld.sock'  port: 3306  Ubuntu 24.04
Feb 24 08:49:13 ip-172-31-89-204 mariadbd[11516]: 2025-02-24  8:49:13 0 [Note] InnoDB: Buffer pool(s) load completed at 250224  8:49:13
Feb 24 08:49:13 ip-172-31-89-204 systemd[1]: Started mariadb.service - MariaDB 10.11.8 database server.
Feb 24 08:49:13 ip-172-31-89-204 /etc/mysql/debian-start[11544]: Checking for insecure root accounts.
```

Connect to MariaDB and start replication:

CHANGE MASTER TO MASTER_HOST='3.89.232.189',
MASTER_USER='replica',
MASTER_PASSWORD='replica_password',
MASTER_LOG_FILE='mysql-bin.000001', -- Use actual File value
MASTER_LOG_POS=154; -- Use actual Position value
START SLAVE;
SHOW SLAVE STATUS\G;

```
ubuntu@ip-172-31-89-204:~$ sudo mariadb -u root
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 36
Server version: 10.11.8-MariaDB-0ubuntu0.24.04.1 Ubuntu 24.04

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)]> SHOW SLAVE STATUS\G;
*************************** 1. row ***************************
               Slave_IO_State: Waiting for master to send event
                  Master_Host: 3.89.232.189
                  Master_User: replica
                  Master_Port: 3306
                Connect_Retry: 60
              Master_Log_File: mysql-bin.000001
          Read_Master_Log_Pos: 493628
               Relay_Log_File: mysql-relay-bin.000002
                Relay_Log_Pos: 555
        Relay_Master_Log_File: mysql-bin.000001
             Slave_IO_Running: Yes
            Slave_SQL_Running: Yes
```

Step 3: Configure Instance 2 (Apache + MariaDB Master)

1. Setup Web Server

sudo apt update && sudo apt install -y apache2 php php-mysql nfs-common
sudo mount 44.203.254.53:/nfs/wp-data /var/www/html

echo "44.203.254.53:/nfs/wp-data /var/www/html nfs defaults 0 0" | sudo tee -a /etc/fstab

```
ubuntu@ip-172-31-87-44:~$ echo "44.203.254.53:/nfs/wp-data /var/www/html nfs defaults 0 0" | sudo tee -a /etc/fstab
44.203.254.53:/nfs/wp-data /var/www/html nfs defaults 0 0
ubuntu@ip-172-31-87-44:~$
```

sudo mount 44.203.254.53:/nfs/db-data /var/log/mysql
echo "44.203.254.53:/nfs/db-data /var/log/mysql nfs defaults 0 0" | sudo tee -a /etc/fstab

```
ubuntu@ip-172-31-87-44:/var/log/mysql$ sudo mount 44.203.254.53:/nfs/db-data /var/log/mysql
ubuntu@ip-172-31-87-44:/var/log/mysql$ echo "44.203.254.53:/nfs/db-data /var/log/mysql nfs defaults 0 0" | sudo tee -a /etc/fstab
44.203.254.53:/nfs/db-data /var/log/mysql nfs defaults 0 0
ubuntu@ip-172-31-87-44:/var/log/mysql$
```

2. Setup MariaDB Master

sudo apt install -y mariadb-server
sudo nano /etc/mysql/mariadb.conf.d/50-server.cnf

Modify configuration:

[mysqld]
bind-address = 0.0.0.0
server-id = 1
log_bin = /var/log/mysql/mysql-bin.log
binlog_do_db = wordpress

```
[mysqld]

#
# * Basic Settings
#
bind-address = 0.0.0.0
server-id = 1
log_bin = /var/log/mysql/mysql-bin.log
binlog_do_db = wordpress
```

Restart MariaDB:

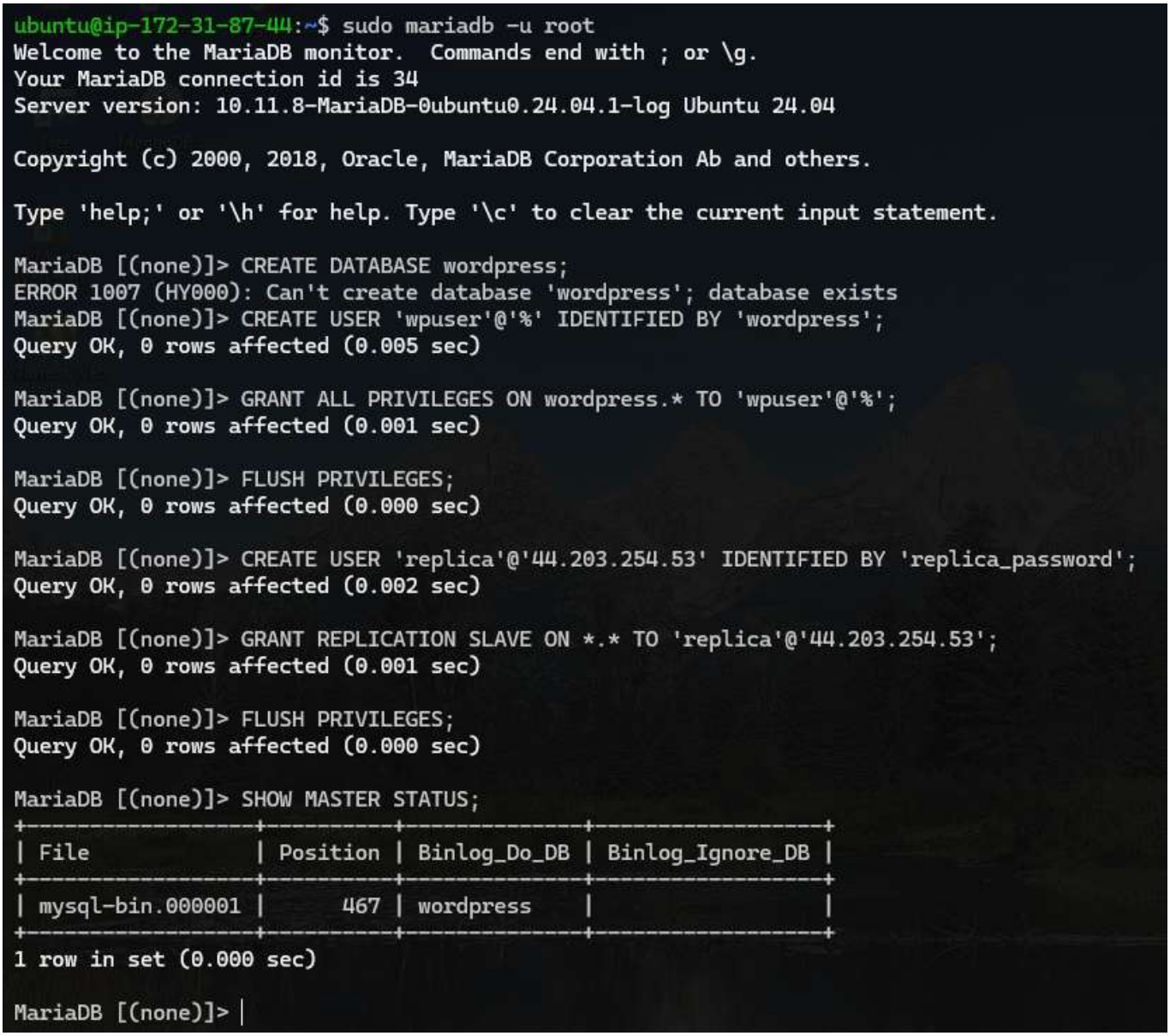
sudo systemctl restart mariadb

Create database and user:

CREATE DATABASE wordpress;
CREATE USER 'wpuser'@'%' IDENTIFIED BY 'wordpress';
GRANT ALL PRIVILEGES ON wordpress.* TO 'wpuser'@'%';
FLUSH PRIVILEGES;

Enable replication:

CREATE USER 'replica'@'44.203.254.53' IDENTIFIED BY 'replica_password';
GRANT REPLICATION SLAVE ON *.* TO 'replica'@'44.203.254.53';
FLUSH PRIVILEGES;
SHOW MASTER STATUS;



Step 4: Configure WordPress

cd /var/www/html
sudo wget https://wordpress.org/latest.tar.gz
sudo tar -xzf latest.tar.gz
sudo mv wordpress/* .
sudo rm -rf wordpress latest.tar.gz
sudo chown -R www-data:www-data /var/www/html
sudo chmod -R 755 /var/www/html

Edit wp-config.php:

sudo nano /var/www/html/wp-config.php

Modify:

define('DB_NAME', 'wordpress');
define('DB_USER', 'wpuser');
define('DB_PASSWORD', 'wordpress’);
define('DB_HOST', '3.89.232.189');

Restart Apache:

sudo systemctl restart apache2

```
ubuntu@ip-172-31-87-44:/var/www/html$ cat wp-config.php
<?php
/**
 * The base configuration for WordPress
 *
 * The wp-config.php creation script uses this file during the installation.
 * You don't have to use the website, you can copy this file to "wp-config.php"
 * and fill in the values.
 *
 * This file contains the following configurations:
 *
 * * Database settings
 * * Secret keys
 * * Database table prefix
 * * ABSPATH
 *
 * @link https://developer.wordpress.org/advanced-administration/wordpress/wp-config/
 *
 * @package WordPress
 */

// ** Database settings - You can get this info from your web host ** //
/** The name of the database for WordPress */
define( 'DB_NAME', 'wordpress' );

/** Database username */
define( 'DB_USER', 'wpuser' );

/** Database password */
define( 'DB_PASSWORD', 'wordpress' );

/** Database hostname */
define( 'DB_HOST', '3.89.232.189' );

/** Database charset to use in creating database tables. */
define( 'DB_CHARSET', 'utf8mb4' );

/** The database collate type. Don't change this if in doubt. */
define( 'DB_COLLATE', '' );
```

Step 5: Testing

1. Check NFS

df -h

```
ubuntu@ip-172-31-87-44:~$ df -h
Filesystem                  Size  Used Avail Use% Mounted on
/dev/root                   6.8G  2.3G  4.5G  34% /
tmpfs                       479M     0  479M   0% /dev/shm
tmpfs                       192M  948K  191M   1% /run
tmpfs                       5.0M     0  5.0M   0% /run/lock
/dev/xvda16                 881M   76M  744M  10% /boot
/dev/xvda15                 105M  6.1M   99M   6% /boot/efi
tmpfs                        96M   12K   96M   1% /run/user/1000
44.203.254.53:/nfs/wp-data  6.8G  2.4G  4.4G  35% /var/www/html
44.203.254.53:/nfs/db-data  6.8G  2.4G  4.4G  35% /var/log/mysql
```

2. Verify Web Server

Open http://3.89.232.189 in a browser.