

Universidad del Caribe

2000

CANCUN, QUINTANA ROO, MÉXICO

CONOCIMIENTO Y CULTURA PARA EL DESARROLLO HUMANO

Computo de alto desempeño

Clústeres y beckmark

Jiménez Sánchez / Ismael

Ingeniería en Datos e Inteligencia Organizacional

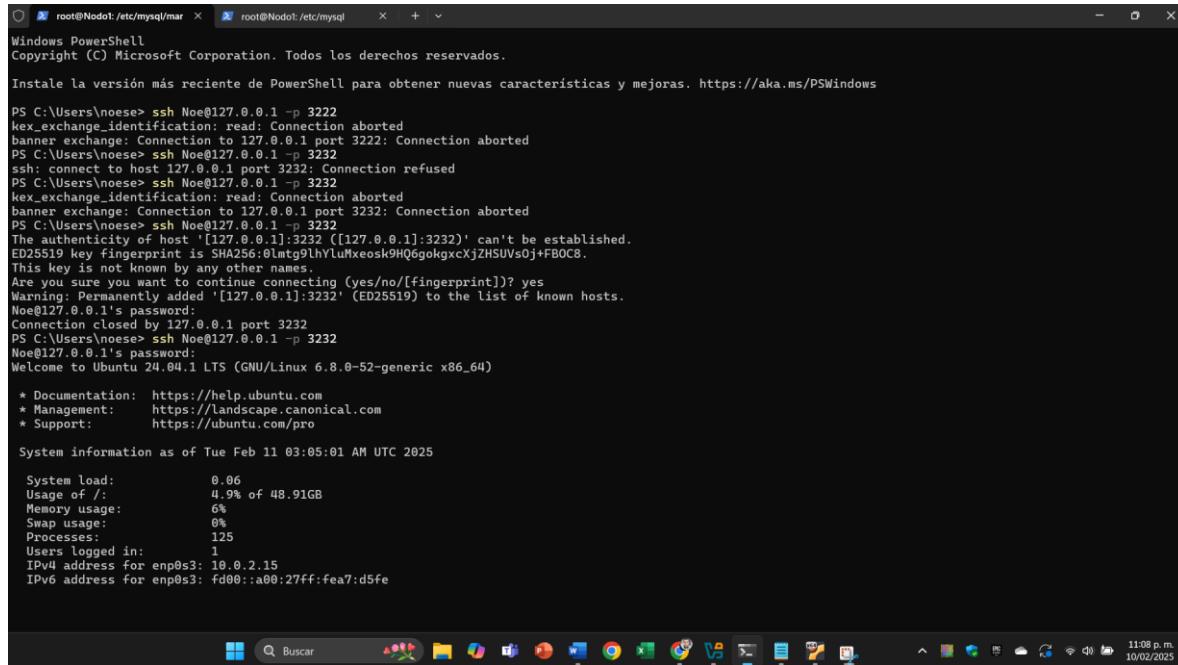
- Chablé Martín Noé Sebastián

Cancún, Quintana Roo, 17 de Febrero de 2025

El proceso comenzó con la instalación de SSH y MariaDB en cada nodo, configurando los servidores MySQL para permitir la creación del clúster. Se definieron los nodos y se configuraron las conexiones entre ellos.

Cada nodo fue configurado con MariaDB Galera, asegurando la sincronización y validación entre los servidores. Se realizaron pruebas con diferentes configuraciones de hardware (número de núcleos) y número de nodos para evaluar el rendimiento.

Instalación del ssh e inicio



The screenshot shows a Windows PowerShell window with two tabs. The left tab shows the command PS C:\Users\noese> ssh Noe@127.0.0.1 -p 3222 and its output, which includes a warning about a known host fingerprint and a password prompt. The right tab shows the command root@Nodo0:/etc/mysql/ and its output, which is mostly blank. The taskbar at the bottom shows various icons for common applications like File Explorer, Edge, and FileZilla.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. Todos los derechos reservados.

Instale la versión más reciente de PowerShell para obtener nuevas características y mejoras. https://aka.ms/PSWindows

PS C:\Users\noese> ssh Noe@127.0.0.1 -p 3222
kex_exchange_identification: read: Connection aborted
banner exchange: Connection to 127.0.0.1 port 3222: Connection aborted
PS C:\Users\noese> ssh Noe@127.0.0.1 -p 3232
ssh: connect to host 127.0.0.1 port 3232: Connection refused
PS C:\Users\noese> ssh Noe@127.0.0.1 -p 3232
kex_exchange_identification: read: Connection aborted
banner exchange: Connection to 127.0.0.1 port 3232: Connection aborted
PS C:\Users\noese> ssh Noe@127.0.0.1 -p 3232
The authenticity of host '[127.0.0.1]:3232 ([127.0.0.1]:3232)' can't be established.
ED25519 key fingerprint is SHA256:0Lmtg9lylumxeosk9HQ6goKgxcXjZHSUVs0j+FB0C8.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '[127.0.0.1]:3232' (ED25519) to the list of known hosts.
Noe@127.0.0.1's password:
Connection closed by 127.0.0.1 port 3232
PS C:\Users\noese> ssh Noe@127.0.0.1 -p 3232
Noe@127.0.0.1's password:
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-52-generic x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Tue Feb 11 03:05:01 AM UTC 2025

System load:          0.06
Usage of /:           4.9% of 48.91GB
Memory usage:         6%
Swap usage:           0%
Processes:            125
Users logged in:     1
IPv4 address for enp0s3: 10.0.2.15
IPv6 address for enp0s3: fd00::a00:27ff:fea7:d5fe
```

Instalacion de mariadb y de mas cosas

```
root@Nodo1:/etc/mysql/nar x root@Nodo1:/etc/mysql x + x

Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  python3-software-properties
The following packages will be upgraded:
  python3-software-properties software-properties-common
2 upgraded, 0 newly installed, 0 to remove and 138 not upgraded.
Need to get 44.1 kB of archives.
After this operation, 0 B of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 software-properties-common all 0.99.49.1 [14.4 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 python3-software-properties all 0.99.49.1 [29.7 kB]
Fetched 44.1 kB in 1s (84.0 kB/s)
(Reading database ... 83893 files and directories currently installed.)
Preparing to unpack .../software-properties-common_0.99.49.1_all.deb ...
Unpacking software-properties-common (0.99.49.1) over (0.99.48) ...
Preparing to unpack .../python3-software-properties_0.99.49.1_all.deb ...
Unpacking python3-software-properties (0.99.49.1) over (0.99.48) ...
Setting up python3-software-properties (0.99.49.1) ...
Setting up software-properties-common (0.99.49.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for dbus (1.14.10-4ubuntu4.1) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@Nodo1:/home/Noe# apt update
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:2 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

Creacion del servidor Mysqsl

Creación del Cluster/Nodo

```
root@Nodo1:/home/Noe# Administrador:Windows Pow + 
Main PID: 950 (code=exited, status=1/FAILURE)
Status: "MariaDB server is down"
CPU: 959ms

Feb 11 04:21:28 Nodo1 mariadb[950]: 2025-02-11  4:21:28 0 [ERROR] WSREP: failed to open gcomm backend connection: 110: failed to reach primary view: 110 (P
Feb 11 04:21:28 Nodo1 mariadb[950]:           at ./gcomm/src/gc.cpp:connect():160
Feb 11 04:21:28 Nodo1 mariadb[950]: 2025-02-11  4:21:28 0 [ERROR] WSREP: ./gcs/src/gcs_core.cpp:gcs_core_open():219: Failed to open backend connection: -1>
Feb 11 04:21:28 Nodo1 mariadb[950]: 2025-02-11  4:21:31 0 [ERROR] WSREP: ./gcs/src/gcs.cpp:gcs_open():1668: Failed to open channel 'test_cluster' at 'gcom
Feb 11 04:21:31 Nodo1 mariadb[950]: 2025-02-11  4:21:31 0 [ERROR] WSREP: gcs connect failed: Connection timed out
Feb 11 04:21:31 Nodo1 mariadb[950]: 2025-02-11  4:21:31 0 [ERROR] WSREP: wsrep::connect(gcomm://192.168.56.101) failed: 7
Feb 11 04:21:31 Nodo1 mariadb[950]: 2025-02-11  4:21:31 0 [ERROR] Aborting
Feb 11 04:21:31 Nodo1 systemd[1]: mariadb.service: Main process exited, code=exited, status=1/FAILURE
Feb 11 04:21:31 Nodo1 systemd[1]: mariadb.service: Failed with result 'exit-code'.
Feb 11 04:21:31 Nodo1 systemd[1]: Failed to start mariadb.service - MariaDB 10.11.8 database server.

root@Nodo1:/home/Noe# galera_new_cluster
root@Nodo1:/home/Noe# netstat -tlpn
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State      PID/Program name
tcp     0      0 0.0.0.0:4567             0.0.0.0:*            LISTEN    1578/mariadb
tcp     0      0 0.0.0.0:3306             0.0.0.0:*            LISTEN    1578/mariadb
tcp     0      0 127.0.0.53:53            0.0.0.0:*            LISTEN    467/systemd-resolve
tcp     0      0 127.0.0.54:53            0.0.0.0:*            LISTEN    467/systemd-resolve
tcp6    0      0 ::1:22                  ::*:                LISTEN    1/init
root@Nodo1:/home/Noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_size | 1 |
+-----+-----+
root@Nodo1:/home/Noe# mysql -u root --execute="SHOW GLOBAL STATUS WHERE Variable_name IN ('wsrep_ready', 'wsrep_cluster_size', 'wsrep_cluster_status', 'wsre
p_connected');"
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_size | 1 |
| wsrep_cluster_status | Primary |
| wsrep_connected | ON |
| wsrep_ready | ON |
+-----+-----+
root@Nodo1:/home/Noe#
```

Top

Autoguardado Poryecto_Part1 Buscar

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Pegar Portapapeles

[sudo] password for Noe:
root@Nodo1:/home/Noe# top
top - 18:58:49 up 1:03, 5 users, load average: 0.00, 0.00, 0.00
Tasks: 149 total, 1 running, 148 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.2 us, 0.8 sy, 0.0 ni, 93.9 id, 0.0 wa, 0.0 hi, 1.1 si, 0.0 st
MiB Mem : 4063.7 total, 3144.1 free, 573.2 used, 568.4 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used. 3490.5 avail Mem

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
10	root	0	-20	0	0	0	I	1.0	0.0	0:00.41	kworker/0:0H-kblockd
2004	root	20	0	0	0	0	I	1.0	0.0	0:01.80	kworker/1:0-events
2314	Noe	20	0	15132	6972	5120	S	1.0	0.2	0:00.53	sshd
78	root	20	0	0	0	0	I	0.3	0.0	0:00.36	kworker/u7:2-events_freezable_power_-
381	root	rt	0	288988	26880	8576	S	0.3	0.6	0:02.74	multipathd
1220	root	20	0	0	0	0	I	0.3	0.0	0:05.21	kworker/0:0-ata_sff
1869	mysql	20	0	1936604	133168	27264	S	0.3	3.2	0:04.51	mariadb
2252	root	20	0	11912	5888	3712	S	0.3	0.1	0:00.38	top
2334	root	20	0	11912	5888	3712	R	0.3	0.1	0:00.03	top
1	root	20	0	22536	13552	9456	S	0.0	0.3	0:02.46	systemd
2	root	20	0	0	0	0	S	0.0	0.0	0:00.03	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:00.00	pool_workqueue_release
4	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-rCU_g
5	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-rCU_p
6	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-slub_
7	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-nets
11	root	20	0	0	0	0	I	0.0	0.0	0:00.00	kworker/u6:0-ext4-rsv-conversion
12	root	0	-20	0	0	0	I	0.0	0.0	0:00.00	kworker/R-mm_pe
13	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_kthread
14	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_rude_kthread
15	root	20	0	0	0	0	I	0.0	0.0	0:00.00	rcu_tasks_trace_kthread

```
sysbench --threads=1 --db-driver=mysql --mysql-user=root --events=0 oltp_read_only prepare
```

PROCESAMIENTO DE DATOS | Discord | #hpcompute-re | Galera4 Mariadb en Ubuntu | Crash Recovery — Galera | Eliminar texto en vi | Conocimiento y Cultura | +

discord.com/channels/743332612176609342/1330698114293567509

```
root@Nod0t:/home/Noe
top - 19:02:51 up 1:07, 5 users, load average: 0.00, 0.00, 0.00
Tasks: 148 total, 1 running, 147 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.1 us, 0.6 sy, 0.0 ni, 94.6 id, 0.1 wa, 0.0 hi, 4.5 si, 0.0 st
MiB Mem : 4863.7 total, 3152.4 free, 562.7 used, 576.8 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used. 3581.0 avail Mem

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
2314 Noe 20 0 15132 6972 5120 S 1.7 0.2 0:01.35 sshd
1756 root 20 0 0 0 0 I 1.0 0.0 0:22.27 kworker/2:0-ata_sff
1869 mysql 20 0 1936064 148816 30976 S 0.7 3.6 0:05.35 mariadb
624 root 20 0 468968 13312 11264 S 0.3 0.3 0:00.47 udisksd
1229 root 20 0 0 0 I 0.3 0.0 0:05.68 kworker/0:0-events

root@Nod0t:/home/Noe
root@Nod0t:/home/Noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_size | 1 |
+-----+-----+
root@Nod0t:/home/Noe# mysql -u root -p -e "create database sbtest"
Enter password:
root@Nod0t:/home/Noe# sysbench --threads=1 --db-driver=mysql --mysql-user=root --events=0 oltp-
read_only prepare
sysbench 1.0.20 (using system LuaJIT 2.1.0-beta3)

# Creating table 'sbtest1'...
# Inserting 10000 records into 'sbtest1'
# Creating a secondary index on 'sbtest1'...
root@Nod0t:/home/Noe#
```

02:02 p.m.
12/02/2025

PROCESAMIENTO DE DATOS | Discord | #hpcompute-re | Galera4 Mariadb en Ubuntu | Crash Recovery — Galera | Eliminar texto en vi | Conocimiento y Cultura | +

discord.com/channels/743332612176609342/1330698114293567509

```
root@Nod0t:/home/Noe
top - 19:05:21 up 1:10, 5 users, load average: 0.03, 0.01, 0.00
Tasks: 148 total, 1 running, 147 sleeping, 0 stopped, 0 zombie
%Cpu(s): 3.5 us, 12.4 sy, 0.0 ni, 82.6 id, 0.0 wa, 0.0 hi, 1.6 si, 0.0 st
MiB Mem : 4863.7 total, 3025.9 free, 683.6 used, 576.8 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used. 3380.1 avail Mem

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
1869 mysql 20 0 1936064 148816 30976 S 31.6 3.6 0:06.59 mariadb
2386 root 20 0 99492 14088 11264 S 24.6 0.3 0:00.74 sysbench
2800 root 20 0 0 0 I 1.0 0.0 0:02.76 kworker/1:0-events
2252 root 20 0 11912 5888 3712 R 0.3 0.1 0:01.45 top
2314 Noe 20 0 15132 6972 5120 S 0.3 0.2 0:02.05 sshd

root@Nod0t:/home/Noe
root@Nod0t:/home/Noe# sysbench --threads=1 --time=35 --rate=0 --db-driver=mysql --mysql-user=roo
ot --events=0 oltp_read_only run
sysbench 1.0.20 (using system LuaJIT 2.1.0-beta3)

Creating table 'sbtest1'...
Inserting 10000 records into 'sbtest1'
Creating a secondary index on 'sbtest1'...
root@Nod0t:/home/Noe# sysbench --threads=1 --time=35 --rate=0 --db-driver=mysql --mysql-user=roo
ot --events=0 oltp_read_only run
sysbench 1.0.20 (using system LuaJIT 2.1.0-beta3)

Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!
```

02:05 p.m.
12/02/2025

```
root@Nodo1:/home/Noe ~ + 
sysbench 1.0.20 (using system LuaJIT 2.1.0-beta3)
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
    queries performed:
        read:          421680
        write:         0
        other:        69240
        total:        481920
    transactions:   30120 (860.51 per sec.)
    queries:       481920 (13768.21 per sec.)
    ignored errors: 0      (0.00 per sec.)
    reconnects:    0      (0.00 per sec.)

General statistics:
    total time:      35.0007s
    total number of events: 30120

Latency (ms):
    min:             0.81
    avg:            1.16
    max:            21.22
    95th percentile: 1.86
    sum:           34948.01

Threads fairness:
    events (avg/stddev): 30120.0000/0.00
    execution time (avg/stddev): 34.9480/0.00

root@Nodo1:/home/Noe#
```

02:06 p.m.
12/02/2025

Prueba de 1 core ,1 nodo y 60 segundos(1min)

- **oltp_read_only**

```
root@Nodo1:/home/Noe ~ + 
Threads started!

SQL statistics:
    queries performed:
        read:          137452
        write:         0
        other:        19636
        total:        157088
    transactions:   9818 (163.57 per sec.)
    queries:       157088 (2617.15 per sec.)
    ignored errors: 0      (0.00 per sec.)
    reconnects:    0      (0.00 per sec.)

General statistics:
    total time:      60.0023s
    total number of events: 9818

Latency (ms):
    min:             1.18
    avg:            6.10
    max:            37.74
    95th percentile: 12.98
    sum:           59908.50

Threads fairness:
    events (avg/stddev): 9818.0000/0.00
    execution time (avg/stddev): 59.9085/0.00

root@Nodo1:/home/Noe#
```

- **bulk_insert**

```

root@Nodo1:/home/Noe ~ + -
Initializing worker threads...
Threads started!
FATAL: mysql_drv_query() returned error 1136 (Column count doesn't match value count at row 1) for query 'INSERT INTO sbtest1 VALUES(1,1),(2,2),(3,3),(4,4),(5,5),(6,6),(7,7),(8,8),(9,9),(10,10),(11,11),(12,12),(13,13),(14,14),(15,15),(16,16),(17,17),(18,18),(19,19),(20,20),(21,21),(22,22),(23,23),(24,24),(25,25),(26,26),(27,27),(28,28),(29,29),(30,30),(31,31),(32,32),(33,33),(34,34),(35,35),(36,36),(37,37),(38,38),(39,39),(40,40),(41,41),(42,42),(43,43),(44,44),(45,45),(46,46),(47,47),(48,48),(49,49),(50,50),(51,51),(52,52),(53,53),(54,54),(55,55),(56,56),(57,57),(58,58),(59,59),(60,60),(61,61),(62,62),(63,63),(64,64),(65,65),(66,66),(67,67),(68,68),(69,69),(70,70),(71,71),(72,72),(73,73),(74,74),(75,75),(76,76),(77,77),(78,78),(79,79),(80,80),(81,81),(82,82),(83,83),(84,84),(85,85),(86,86),(87,87),(88,88),(89,89),(90,90),(91,91),(92,92),(93,93),(94,94),(95,95),(96,96),(97,97),(98,98),(99,99),(100,100),(101,101),(102,102),(103,103),(104,104),(105,105),(106,106),(107,107),(108,108),(109,109),(110,110),(111,111),(112,112),(113,113),(114,114),(115,115),(116,116),(117,117),(118,118),(119,119),(120,120),(121,121),(122,122),(123,123),(124,124),(125,125),(126,126),(127,127),(128,128),(129,129),(130,130),(131,131),(132,132),(133,133),(134,134),(135,135),(136,136),(137,137),(138,138),(139,139),(140,140),(141,141),(142,142),(143,143),(144,144),(145,145),(146,146),(147,147),(148,148),(149,149),(150,150),(151,151),(152,152),(153,153),(154,154),(155,155),(156,156),(157,157),(158,158),(159,159),(160,160),(161,161),(162,162),(163,163),(164,164),(165,165),(166,166),(167,167),(168,168),(169,169),(170,170),(171,171),(172,172),(173,173),(174,174),(175,175),(176,176),(177,177),(178,178),(179,179),(180,180),(181,181),(182,182),(183,183),(184,184),(185,185),(186,186),(187,187),(188,188),(189,189),(190,190),(191,191),(192,192),(193,193),(194,194),(195,195),(196,196),(197,197),(198,198),(199,199),(200,200),(201,201),(202,202),(203,203),(204,204),(205,205),(206,206),(207,207),(208,208),(209,209),(210,210),(211,211),(212,212),(213,213),(214,214),(215,215),(216,216),(217,217),(218,218),(219,219),(220,220),(221,221),(222,222),(223,223),(224,224),(225,225),(226,226),(227,227),(228,228),(229,229),(230,230),(231,231),(232,232),(233,233),(234,234),(235,235),(236,236),(237,237),(238,238),(239,239),(240,240),(241,241),(242,242),(243,243),(244,244),(245,245),(246,246),(247,247),(248,248),(249,249),(250,250),(251,251),(252,252),(253,253),(254,254),(255,255),(256,256),(257,257),(258,258),(259,259),(260,260),(261,261),(262,262),(263,263),(264,264),(265,265),(266,266),(267,267),(268,268),(269,269),(270,270),(271,271),(272,272),(273,273),(274,274),(275,275),(276,276),(277,277),(278,278),(279,279),(280,280),(281,281),(282,282),(283,283),(284,284),(285,285),(286,286),(287,287),(288,288),(289,289),(290,290),(291,291),(292,292),(293,293),(294,294),(295,295),(296,296),(297,297),(298,298),(299,299),(300,300),(301,301),(302,302),(303,303),(304,304),(305,305),(306,306),(307,307),(308,308),(309,309),(310,310),(311,311),(312,312),(313,313),(314,314),(315,315),(316,316),(317,317),(318,318),(319,319),(320,320),(321,321),(322,322),(323,323),(324,324),(325,325),(326,326),(327,327),(328,328),(329,329),(330,330),(331,331),(332,332),(333,333),(334,334),(335,335),(336,336),(337,337),(338,338),(339,339),(340,340),(341,341),(342,342),(343,343),(344,344),(345,345),(346,346),(347,347),(348,348),(349,349),(350,350),(351,351),(352,352),(353,353),(354,354),(355,355),(356,356),(357,357),(358,358),(359,359),(360,360),(361,361),(362,362),(363,363),(364,364),(365,365),(366,366),(367,367),(368,368),(369,369),(370,370),(371,371),(372,372),(373,373),(374,374),(375,375),(376,376),(377,377),(378,378),(379,379),(380,380),(381,381),(382,382),(383,383),(384,384),(385,385),(386,386),(387,387),(388,388),(389,389),(390,390),(391,391),(392,392),(393,393),(394,394),(395,395),(396,396),(397,397),(398,398),(399,399),(400,400),(401,401),(402,402),(403,403),(404,404),(405,405),(406,406),(407,407),(408,408),(409,409),(410,410),(411,411),(412,412),(413,413),(414,414),(415,415),(416,416),(417,417),(418,418),(419,419)FATAL: 'thread_run' function failed: /usr/share/sysbench/bulk_insert.lua:3
8: db_bulk_insert_next() failed
root@Nodo1:/home/Noe# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 bulk_insert run

```

- oltp_delete

```

root@Nodo1:/home/Noe ~ + -
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!
SQL statistics:
queries performed:
  read: 0
  write: 4461
  other: 203810
  total: 268271
transactions:
  queries: 268271 (3470.21 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.00009s
  total number of events: 268271

Latency (ms):
  min: 0.02
  avg: 0.29
  max: 33.51
  95th percentile: 0.23
  sum: 59620.25

Threads fairness:
  events (avg/stddev): 208271.0000/0.00
  execution time (avg/stddev): 59.6203/0.00
root@Nodo1:/home/Noe#

```

- oltp_insert

```
root@Nodo1:/home/Noe ~ + - x
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 0
    write: 9824
    other: 0
    total: 9824
  transactions: 9824 (163.71 per sec.)
  queries: 9824 (163.71 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0039s
  total number of events: 9824

Latency (ms):
  min: 1.71
  avg: 6.10
  max: 28.48
  95th percentile: 12.08
  sum: 59919.16

Threads fairness:
  events (avg/stddev): 9824.0000/0.00
  execution time (avg/stddev): 59.9192/0.00
root@Nodo1:/home/Noe#
```

- `oltp_point_select`

```
root@Nodo1:/home/Noe ~ + - x
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 325108
    write: 0
    other: 0
    total: 325108
  transactions: 325108 (5417.41 per sec.)
  queries: 325108 (5417.41 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0014s
  total number of events: 325108

Latency (ms):
  min: 0.02
  avg: 0.18
  max: 31.42
  95th percentile: 0.18
  sum: 59393.34

Threads fairness:
  events (avg/stddev): 325108.0000/0.00
  execution time (avg/stddev): 59.3933/0.00
root@Nodo1:/home/Noe#
```

- `oltp_read_only`

```
root@Nodo1:/home/Noe# Running the test with following options:  
Number of threads: 1  
Initializing random number generator from current time  
  
Initializing worker threads...  
Threads started!  
  
SQL statistics:  
    queries performed:  
        read: 257740  
        write: 0  
        other: 36820  
        total: 294560  
    transactions: 18410 (306.74 per sec.)  
    queries: 294560 (4907.81 per sec.)  
    ignored errors: 0 (0.00 per sec.)  
    reconnects: 0 (0.00 per sec.)  
  
General statistics:  
    total time: 60.0049s  
    total number of events: 18410  
  
Latency (ms):  
    min: 0.46  
    avg: 3.25  
    max: 51.32  
    95th percentile: 8.74  
    sum: 59846.81  
  
Threads fairness:  
    events (avg/stddev): 18410.0000/0.00  
    execution time (avg/stddev): 59.8468/0.00  
root@Nodo1:/home/Noe#
```

- **oltp_read_write**

```
root@Nodo1:/home/Noe# Running the test with following options:  
Number of threads: 1  
Initializing random number generator from current time  
  
Initializing worker threads...  
Threads started!  
  
SQL statistics:  
    queries performed:  
        read: 210098  
        write: 53561  
        other: 36481  
        total: 300140  
    transactions: 15007 (250.08 per sec.)  
    queries: 300140 (5001.53 per sec.)  
    ignored errors: 0 (0.00 per sec.)  
    reconnects: 0 (0.00 per sec.)  
  
General statistics:  
    total time: 60.0069s  
    total number of events: 15007  
  
Latency (ms):  
    min: 2.10  
    avg: 4.00  
    max: 23.81  
    95th percentile: 7.30  
    sum: 59964.22  
  
Threads fairness:  
    events (avg/stddev): 15007.0000/0.00  
    execution time (avg/stddev): 59.9642/0.00  
root@Nodo1:/home/Noe#
```

- **oltp_update_index**

```
root@Nodo1:/home/Noe ~ + ^

Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 0
    write: 28111
    other: 2329
    total: 30440
  transactions: 30440 (507.30 per sec.)
  queries: 30440 (507.30 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0018s
  total number of events: 30440

Latency (ms):
  min: 0.02
  avg: 1.97
  max: 29.47
  95th percentile: 3.89
  sum: 59948.10

Threads fairness:
  events (avg/stddev): 30440.0000/0.00
  execution time (avg/stddev): 59.9481/0.00

root@Nodo1:/home/Noe#
```

- **oltp_update_non_index**

```
root@Nodo1:/home/Noe ~ + ^

Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 0
    write: 23389
    other: 1927
    total: 25316
  transactions: 25316 (421.90 per sec.)
  queries: 25316 (421.90 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0022s
  total number of events: 25316

Latency (ms):
  min: 0.02
  avg: 2.37
  max: 19.43
  95th percentile: 5.00
  sum: 59944.97

Threads fairness:
  events (avg/stddev): 25316.0000/0.00
  execution time (avg/stddev): 59.9450/0.00

root@Nodo1:/home/Noe#
```

- **oltp_write_only**

```
root@Nodo1:/home/Noe ~ + - x
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 0
    write: 73185
    other: 40449
    total: 113634
  transactions: 18939 (315.61 per sec.)
  queries: 113634 (1893.64 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0064s
  total number of events: 18939

Latency (ms):
  min: 1.15
  avg: 3.17
  max: 118.60
  95th percentile: 6.09
  sum: 59945.32

Threads fairness:
  events (avg/stddev): 18939.0000/0.00
  execution time (avg/stddev): 59.9453/0.00
root@Nodo1:/home/Noe#
```

- **select_random_points**

```
root@Nodo1:/home/Noe ~ + - x
Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 18446
    write: 0
    other: 0
    total: 18446
  transactions: 18446 (307.40 per sec.)
  queries: 18446 (307.40 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0048s
  total number of events: 18446

Latency (ms):
  min: 0.51
  avg: 3.25
  max: 31.97
  95th percentile: 6.79
  sum: 59940.01

Threads fairness:
  events (avg/stddev): 18446.0000/0.00
  execution time (avg/stddev): 59.9460/0.00
root@Nodo1:/home/Noe#
```

Prueba con 2 core, 1 nodo y 60 segundos

- **bulk_insert**

```

root@Nodo1:/home/Noe ~ + 
Creating table 'sbtest1'...
Creating table 'sbtest2'...
root@Nodo1:/home/Noe# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 bulk_insert run
sysbench 1.0.20 (using system LuaJIT 2.1.0-beta3)

Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

FATAL: mysql_drv_query() returned error 1136 (Column count doesn't match value count at row 1) for query  INSERT INTO sbtest1 VALUES(1,1),(2,2),
(3,3),(4,4),(5,5),(6,6),(7,7),(8,8),(9,9),(10,10),(11,11),(12,12),(13,13),(14,14),(15,15),(16,16),(17,17),(18,18),(19,19),(20,20),(21,21),(22,22),
),(23,23),(24,24),(25,25),(26,26),(27,27),(28,28),(29,29),(30,30),(31,31),(32,32),(33,33),(34,34),(35,35),(36,36),(37,37),(38,38),(39,39),(40,40),
),(41,41),(42,42),(43,43),(44,44),(45,45),(46,46),(47,47),(48,48),(49,49),(50,50),(51,51),(52,52),(53,53),(54,54),(55,55),(56,56),(57,57),(58,58),
),(59,59),(60,60),(61,61),(62,62),(63,63),(64,64),(65,65),(66,66),(67,67),(68,68),(69,69),(70,70),(71,71),(72,72),(73,73),(74,74),(75,75),(76,76),
),(77,77),(78,78),(79,79),(80,80),(81,81),(82,82),(83,83),(84,84),(85,85),(86,86),(87,87),(88,88),(89,89),(90,90),(91,91),(92,92),(93,93),(94,94),
),(95,95),(96,96),(97,97),(98,98),(99,99),(100,100),(101,101),(102,102),(103,103),(104,104),(105,105),(106,106),(107,107),(108,108),(109,109),(110,110),
),(111,111),(112,112),(113,113),(114,114),(115,115),(116,116),(117,117),(118,118),(119,119),(120,120),(121,121),(122,122),(123,123),(124,124),
),(125,125),(126,126),(127,127),(128,128),(129,129),(130,130),(131,131),(132,132),(133,133),(134,134),(135,135),(136,136),(137,137),(138,138),
),(139,139),(140,140),(141,141),(142,142),(143,143),(144,144),(145,145),(146,146),(147,147),(148,148),(149,149),(150,150),(151,151),(152,152),(153,
),(154,154),(155,155),(156,156),(157,157),(158,158),(159,159),(160,160),(161,161),(162,162),(163,163),(164,164),(165,165),(166,166),(167,167),
),(168,168),(169,169),(170,170),(171,171),(172,172),(173,173),(174,174),(175,175),(176,176),(177,177),(178,178),(179,179),(180,180),(181,181),(182,
),(183,183),(184,184),(185,185),(186,186),(187,187),(188,188),(189,189),(190,190),(191,191),(192,192),(193,193),(194,194),(195,195),(196,196),
),(197,197),(198,198),(199,199),(200,200),(201,201),(202,202),(203,203),(204,204),(205,205),(206,206),(207,207),(208,208),(209,209),(210,210),
),(211,211),(212,212),(213,213),(214,214),(215,215),(216,216),(217,217),(218,218),(219,219),(220,220),(221,221),(222,222),(223,223),(224,224),
),(225,225),(226,226),(227,227),(228,228),(229,229),(230,230),(231,231),(232,232),(233,233),(234,234),(235,235),(236,236),(237,237),(238,238),(239,239),
),(240,240),(241,241),(242,242),(243,243),(244,244),(245,245),(246,246),(247,247),(248,248),(249,249),(250,250),(251,251),(252,252),(253,253),(254,
),(255,255),(256,256),(257,257),(258,258),(259,259),(260,260),(261,261),(262,262),(263,263),(264,264),(265,265),(266,266),(267,267),(268,268),
),(269,269),(270,270),(271,271),(272,272),(273,273),(274,274),(275,275),(276,276),(277,277),(278,278),(279,279),(280,280),(281,281),(282,282),
),(283,283),(284,284),(285,285),(286,286),(287,287),(288,288),(289,289),(290,290),(291,291),(292,292),(293,293),(294,294),(295,295),(296,296),(297,
),(298,298),(299,299),(300,300),(301,301),(302,302),(303,303),(304,304),(305,305),(306,306),(307,307),(308,308),(309,309),(310,310),(311,311),
),(312,312),(313,313),(314,314),(315,315),(316,316),(317,317),(318,318),(319,319),(320,320),(321,321),(322,322),(323,323),(324,324),(325,325),(3
)

```

• oltp_delete

```

root@Nodo1:/home/Noe ~ + 
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read:          0
    write:        4397
    other:       3188785
    total:      3193182
  transactions: 3193182 (53217.54 per sec.)
  queries:     3193182 (53217.54 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0010s
  total number of events: 3193182

Latency (ms):
  min:            0.00
  avg:            0.04
  max:           32.17
  95th percentile: 0.07
  sum:          118281.16

Threads fairness:
  events (avg/stddev): 1596591.0000/9585.00
  execution time (avg/stddev): 59.1406/0.01

root@Nodo1:/home/Noe#

```

• oltp_insert

```
root@Nodo1:/home/Noe ~ + - x
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 0
    write: 29053
    other: 0
    total: 29053
  transactions: 29053 (484.18 per sec.)
  queries: 29053 (484.18 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0030s
  total number of events: 29053

Latency (ms):
  min: 1.36
  avg: 4.13
  max: 36.61
  95th percentile: 6.91
  sum: 119917.47

Threads fairness:
  events (avg/stddev): 14526.5000/17.50
  execution time (avg/stddev): 59.9587/0.00
root@Nodo1:/home/Noe#
```

- oltp_point_select

```
root@Nodo1:/home/Noe ~ + - x
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 4952900
    write: 0
    other: 0
    total: 4952900
  transactions: 4952900 (82543.54 per sec.)
  queries: 4952900 (82543.54 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0011s
  total number of events: 4952900

Latency (ms):
  min: 0.01
  avg: 0.02
  max: 12.12
  95th percentile: 0.03
  sum: 118535.34

Threads fairness:
  events (avg/stddev): 2476450.0000/10273.00
  execution time (avg/stddev): 59.2677/0.01
root@Nodo1:/home/Noe#
```

- oltp_read_only

```
root@Nodo1:/home/Noe ~ + - X
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read:          4141718
    write:         0
    other:        591674
    total:       4733392
  transactions: 295837 (4930.36 per sec.)
  queries:      4733392 (78885.74 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0013s
  total number of events: 295837

Latency (ms):
  min:            0.33
  avg:            0.40
  max:            8.47
  95th percentile: 0.61
  sum:           119757.41

Threads fairness:
  events (avg/stddev): 147918.5000/885.50
  execution time (avg/stddev): 59.8787/0.00
root@Nodo1:/home/Noe#
```

- oltp_read_write

```
root@Nodo1:/home/Noe ~ + - X
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read:          306236
    write:         79373
    other:        51871
    total:       437480
  transactions: 21874 (364.53 per sec.)
  queries:      437480 (7290.66 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0041s
  total number of events: 21874

Latency (ms):
  min:            2.51
  avg:            5.48
  max:            31.07
  95th percentile: 10.84
  sum:           119945.07

Threads fairness:
  events (avg/stddev): 10937.0000/1.00
  execution time (avg/stddev): 59.9725/0.00
root@Nodo1:/home/Noe#
```

- oltp_update_index

```
root@Nodo1:~/home/Noe ~ + ^

Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read:          0
    write:        29726
    other:       1630
    total:      31356
  transactions: 31356 (522.56 per sec.)
  queries:      31356 (522.56 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0030s
  total number of events: 31356

Latency (ms):
  min:            0.02
  avg:           3.83
  max:          44.49
  95th percentile: 5.47
  sum:         119948.75

Threads fairness:
  events (avg/stddev): 15678.0000/20.00
  execution time (avg/stddev): 59.9744/0.00

root@Nodo1:/home/Noe#
```

- oltp_update_non_index

```
root@Nodo1:~/home/Noe ~ + ^

Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read:          0
    write:        38075
    other:       1677
    total:      31752
  transactions: 31752 (529.15 per sec.)
  queries:      31752 (529.15 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0033s
  total number of events: 31752

Latency (ms):
  min:            0.02
  avg:           3.78
  max:          96.73
  95th percentile: 5.57
  sum:         119938.82

Threads fairness:
  events (avg/stddev): 15876.0000/87.00
  execution time (avg/stddev): 59.9694/0.00

root@Nodo1:/home/Noe#
```

- oltp_write_only

```
root@Nodo1:/home/Noe ~ + ~
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 0
    write: 103552
    other: 55502
    total: 159054
  transactions: 26508 (441.75 per sec.)
  queries: 159054 (2650.61 per sec.)
  ignored errors: 2 (0.03 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0051s
  total number of events: 26508

Latency (ms):
  min: 1.90
  avg: 4.52
  max: 65.27
  95th percentile: 6.91
  sum: 119947.88

Threads fairness:
  events (avg/stddev): 13254.0000/100.00
  execution time (avg/stddev): 59.9738/0.00
root@Nodo1:/home/Noe#
```

- select_random_points

```
root@Nodo1:/home/Noe ~ + ~
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

SQL statistics:
  queries performed:
    read: 1809924
    write: 0
    other: 0
    total: 1809924
  transactions: 1809924 (30163.82 per sec.)
  queries: 1809924 (30163.82 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0013s
  total number of events: 1809924

Latency (ms):
  min: 0.04
  avg: 0.07
  max: 11.64
  95th percentile: 0.12
  sum: 118904.53

Threads fairness:
  events (avg/stddev): 984962.0000/64314.00
  execution time (avg/stddev): 59.4523/0.03
root@Nodo1:/home/Noe#
```

- select_random_ranges

```
root@Nod0t:/home/Noe  +  -  x
Running the test with following options:
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...

Threads started!

SQL statistics:
  queries performed:
    read:          1782382
    write:         0
    other:         0
    total:        1782382
  transactions:  1782382 (29705.11 per sec.)
  queries:       1782382 (29705.11 per sec.)
  ignored errors: 0      (0.00 per sec.)
  reconnects:    0      (0.00 per sec.)

General statistics:
  total time:      60.0012s
  total number of events: 1782382

Latency (ms):
  min:            0.04
  avg:            0.07
  max:            4.66
  95th percentile: 0.13
  sum:           118891.69

Threads fairness:
  events (avg/stddev):   891191.0000/34804.00
  execution time (avg/stddev): 59.4458/0.01

root@Nod0t:/home/Noe#
```

Prueba con 1 core, 2 nodo y 60 segundos

Nodo 1(Código)

Nodo 2(Código)

Conexión

```
root@Nodot:/home/noe# vi /etc/mysql/mariadb.conf.d/60-galera.cnf
root@Nodot:/home/noe# galera_new_cluster
root@Nodot:/home/noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+-----+
| Variable_name | Value |
+-----+
| wsrep_cluster_size | 1 |
+-----+
root@Nodot:/home/noe# vi /etc/mysql/mariadb.conf.d/60-galera.cnf

[1]+ Stopped                  vi /etc/mysql/mariadb.conf.d/60-galera.cnf
root@Nodot:/home/noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size';"
Enter password:
+-----+
| Variable_name | Value |
+-----+
| wsrep_cluster_size | 2 |
+-----+
root@Nodot:/home/noe# vi /etc/mysql/mariadb.conf.d/60-galera.cnf

[2]+ Stopped                  vi /etc/mysql/mariadb.conf.d/60-galera.cnf
root@Nodot:/home/noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size';"
Enter password:
+-----+
| Variable_name | Value |
+-----+
| wsrep_cluster_size | 2 |
+-----+
root@Nodot:/home/noe#
```

Sincronización y validación

```
root@Nodot:/home/Noe  x  root@Nodot:/home/noe  x  +  ~
Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your Internet connection or proxy settings

Last login: Sat Feb 15 00:59:27 2025 from 192.168.56.1
noe@Nodot:~$ sudo su
[sudo] password for noe:
root@Nodot:/home/noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_size | 2 |
+-----+-----+
root@Nodot:/home/noe# mysql -uroot -p -e "create database sbtest"
Enter password:
root@Nodot:/home/noe# mysql -u root -p -e "SHOW GLOBAL STATUS LIKE 'wsrep_ready';"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_ready | ON |
+-----+-----+
root@Nodot:/home/noe# mysql -u root -p -e "SHOW GLOBAL STATUS LIKE 'wsrep_cluster_status';"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_status | Primary |
+-----+-----+
root@Nodot:/home/noe#
```

•bulk_insert

```
root@Nodot:/home/Noe  x  root@Nodot:/home/noe  x  +  ~
Threads started!

SQL statistics:
    queries performed:
        read:                      0
        write:                     441
        other:                     0
        total:                     441
    transactions:                12644670 (210618.55 per sec.)
    queries:                    441   (7.35 per sec.)
    ignored errors:             0   (0.00 per sec.)
    reconnects:                 0   (0.00 per sec.)

General statistics:
    total time:                  60.0343s
    total number of events:      12644670

Latency (ms):
    min:                         0.00
    avg:                         0.00
    max:                        849.55
    95th percentile:              0.00
    sum:                        58117.33

Threads fairness:
    events (avg/stddev):       12644670.0000/0.00
    execution time (avg/stddev): 58.1173/0.00

root@Nodot:/home/noe#
```

•oltp_delete

```
root@Nodot:/home/Noe ~ root@Nodot:/home/noe ~ + -
```

Threads started!

SQL statistics:

queries performed:	
read:	0
write:	5383
other:	1223117
total:	1228500
transactions:	1228500 (20474.22 per sec.)
queries:	1228500 (20474.22 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0006s
total number of events:	1228500

Latency (ms):

min:	0.00
avg:	0.05
max:	18446744073709.55
95th percentile:	0.19
sum:	59671.90

Threads fairness:

events (avg/stddev):	1228500.0000/0.00
execution time (avg/stddev):	59.6719/0.00

```
root@Nodot:/home/noe#
```

• oltp_insert

```
root@Nodot:/home/Noe ~ root@Nodot:/home/noe ~ + -
```

Threads started!

SQL statistics:

queries performed:	
read:	0
write:	20895
other:	0
total:	20895
transactions:	20895 (348.23 per sec.)
queries:	20895 (348.23 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0026s
total number of events:	20895

Latency (ms):

min:	1.45
avg:	2.87
max:	29.25
95th percentile:	3.96
sum:	59941.67

Threads fairness:

events (avg/stddev):	20895.0000/0.00
execution time (avg/stddev):	59.9417/0.00

```
root@Nodot:/home/noe#
```

• oltp_point_select

```
root@Nodot:/home/Noe ~ root@Nodot:/home/noe ~ + ^

Threads started!

SQL statistics:
  queries performed:
    read:          1085976
    write:         0
    other:         0
    total:        1085976
  transactions: 1085976 (18099.10 per sec.)
  queries:      1085976 (18099.10 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0004s
  total number of events: 1085976

Latency (ms):
  min:            0.01
  avg:            0.05
  max:            2.92
  95th percentile: 0.22
  sum:           59705.69

Threads fairness:
  events (avg/stddev): 1085976.0000/0.00
  execution time (avg/stddev): 59.7057/0.00

root@Nodot:/home/noe#
```

- oltp_read_only

```
root@Nodot:/home/Noe ~ root@Nodot:/home/noe ~ + ^

Threads started!

SQL statistics:
  queries performed:
    read:          797076
    write:         0
    other:        113868
    total:        910944
  transactions: 56934 (948.87 per sec.)
  queries:      910944 (15181.87 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0008s
  total number of events: 56934

Latency (ms):
  min:            0.48
  avg:            1.05
  max:            12.47
  95th percentile: 4.33
  sum:           59928.41

Threads fairness:
  events (avg/stddev): 56934.0000/0.00
  execution time (avg/stddev): 59.9284/0.00

root@Nodot:/home/noe#
```

- oltp_read_write

```
root@Nodo1:/home/Noe ~ root@Nodot:/home/noe ~ + -
```

Threads started!

SQL statistics:

queries performed:	
read:	126938
write:	33866
other:	20536
total:	181340
transactions:	9067 (151.04 per sec.)
queries:	181340 (3020.85 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0281s
total number of events:	9067

Latency (ms):

min:	2.71
avg:	6.62
max:	89.84
95th percentile:	11.65
sum:	59999.78

Threads fairness:

events (avg/stddev):	9067.0000/0.00
execution time (avg/stddev):	59.9998/0.00

```
root@Nodot:/home/noe#
```

• oltp_update_index

```
root@Nodo1:/home/Noe ~ root@Nodot:/home/noe ~ + -
```

Threads started!

SQL statistics:

queries performed:	
read:	0
write:	21632
other:	1377
total:	23009
transactions:	23009 (383.46 per sec.)
queries:	23009 (383.46 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0016s
total number of events:	23009

Latency (ms):

min:	0.03
avg:	2.61
max:	71.52
95th percentile:	3.43
sum:	59962.41

Threads fairness:

events (avg/stddev):	23009.0000/0.00
execution time (avg/stddev):	59.9624/0.00

```
root@Nodot:/home/noe#
```

• oltp_update_non_index

```
root@Nodo1:/home/Noe  x  root@Nodot:/home/noe  x  +  -  □  ×  
Threads started!  
  
SQL statistics:  
    queries performed:  
        read:                      0  
        write:                     20270  
        other:                     1278  
        total:                     21548  
    transactions:                21548 (359.11 per sec.)  
    queries:                    21548 (359.11 per sec.)  
    ignored errors:             0 (0.00 per sec.)  
    reconnects:                 0 (0.00 per sec.)  
  
General statistics:  
    total time:                  60.0030s  
    total number of events:      21548  
  
Latency (ms):  
    min:                         0.03  
    avg:                          2.78  
    max:                         29.91  
    95th percentile:              3.96  
    sum:                        59969.35  
  
Threads fairness:  
    events (avg/stddev):        21548.0000/0.00  
    execution time (avg/stddev): 59.9693/0.00  
  
root@Nodot:/home/noe#
```

- oltp_write_only

```
root@Nodo1:/home/Noe  x  root@Nodot:/home/noe  x  +  -  □  ×  
Threads started!  
  
SQL statistics:  
    queries performed:  
        read:                      0  
        write:                     62618  
        other:                     33934  
        total:                     96552  
    transactions:                16092 (268.19 per sec.)  
    queries:                    96552 (1609.14 per sec.)  
    ignored errors:             0 (0.00 per sec.)  
    reconnects:                 0 (0.00 per sec.)  
  
General statistics:  
    total time:                  60.0006s  
    total number of events:      16092  
  
Latency (ms):  
    min:                         1.75  
    avg:                          3.73  
    max:                         64.68  
    95th percentile:              5.67  
    sum:                        59959.68  
  
Threads fairness:  
    events (avg/stddev):        16092.0000/0.00  
    execution time (avg/stddev): 59.9597/0.00  
  
root@Nodot:/home/noe#
```

- select_random_points

```
root@Nodo1:/home/Noe ~ root@Nodot:/home/noe ~ + -
```

Threads started!

SQL statistics:

queries performed:	
read:	19807
write:	0
other:	0
total:	19807
transactions:	19807 (330.10 per sec.)
queries:	19807 (330.10 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0022s
total number of events:	19807

Latency (ms):

min:	0.79
avg:	3.03
max:	8.53
95th percentile:	4.49
sum:	59973.20

Threads fairness:

events (avg/stddev):	19807.0000/0.00
execution time (avg/stddev):	59.9732/0.00

```
root@Nodot:/home/noe#
```

- select_random_ranges

```
root@Nodo1:/home/Noe ~ root@Nodot:/home/noe ~ + -
```

Threads started!

SQL statistics:

queries performed:	
read:	27421
write:	0
other:	0
total:	27421
transactions:	27421 (456.98 per sec.)
queries:	27421 (456.98 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0029s
total number of events:	27421

Latency (ms):

min:	0.46
avg:	2.19
max:	6.76
95th percentile:	2.91
sum:	59977.88

Threads fairness:

events (avg/stddev):	27421.0000/0.00
execution time (avg/stddev):	59.9779/0.00

```
root@Nodot:/home/noe#
```

Prueba con 2 core, 2 nodo y 60 segundos

- bulk_insert

```

root@Nodot:/home/noe  x  root@Nodot:/home/noe  x  +  -
Number of threads: 2
Initializing random number generator from current time

Initializing worker threads...
Threads started!

FATAL: mysql_drv_query() returned error 1062 (Duplicate entry '1' for key 'PRIMARY') for query 'INSERT INTO sbtest1 VALUES(1,1),(2,2),(3,3),(4,4),(5,5),(6,6),(7,7),(8,8),(9,9),(10,10),(11,11),(12,12),(13,13),(14,14),(15,15),(16,16),(17,17),(18,18),(19,19),(20,20),(21,21),(22,22),(23,23),(24,24),(25,25),(26,26),(27,27),(28,28),(29,29),(30,30),(31,31),(32,32),(33,33),(34,34),(35,35),(36,36),(37,37),(38,38),(39,39),(40,40),(41,41),(42,42),(43,43),(44,44),(45,45),(46,46),(47,47),(48,48),(49,49),(50,50),(51,51),(52,52),(53,53),(54,54),(55,55),(56,56),(57,57),(58,58),(59,59),(60,60),(61,61),(62,62),(63,63),(64,64),(65,65),(66,66),(67,67),(68,68),(69,69),(70,70),(71,71),(72,72),(73,73),(74,74),(75,75),(76,76),(77,77),(78,78),(79,79),(80,80),(81,81),(82,82),(83,83),(84,84),(85,85),(86,86),(87,87),(88,88),(89,89),(90,90),(91,91),(92,92),(93,93),(94,94),(95,95),(96,96),(97,97),(98,98),(99,99),(100,100),(101,101),(102,102),(103,103),(104,104),(105,105),(106,106),(107,107),(108,108),(109,109),(110,110),(111,111),(112,112),(113,113),(114,114),(115,115),(116,116),(117,117),(118,118),(119,119),(120,120),(121,121),(122,122),(123,123),(124,124),(125,125),(126,126),(127,127),(128,128),(129,129),(130,130),(131,131),(132,132),(133,133),(134,134),(135,135),(136,136),(137,137),(138,138),(139,139),(140,140),(141,141),(142,142),(143,143),(144,144),(145,145),(146,146),(147,147),(148,148),(149,149),(150,150),(151,151),(152,152),(153,153),(154,154),(155,155),(156,156),(157,157),(158,158),(159,159),(160,160),(161,161),(162,162),(163,163),(164,164),(165,165),(166,166),(167,167),(168,168),(169,169),(170,170),(171,171),(172,172),(173,173),(174,174),(175,175),(176,176),(177,177),(178,178),(179,179),(180,180),(181,181),(182,182),(183,183),(184,184),(185,185),(186,186),(187,187),(188,188),(189,189),(190,190),(191,191),(192,192),(193,193),(194,194),(195,195),(196,196),(197,197),(198,198),(199,199),(200,200),(201,201),(202,202),(203,203),(204,204),(205,205),(206,206),(207,207),(208,208),(209,209),(210,210),(211,211),(212,212),(213,213),(214,214),(215,215),(216,216),(217,217),(218,218),(219,219),(220,220),(221,221),(222,222),(223,223),(224,224),(225,225),(226,226),(227,227),(228,228),(229,229),(230,230),(231,231),(232,232),(233,233),(234,234),(235,235),(236,236),(237,237),(238,238),(239,239),(240,240),(241,241),(242,242),(243,243),(244,244),(245,245),(246,246),(247,247),(248,248),(249,249),(250,250),(251,251),(252,252),(253,253),(254,254),(255,255),(256,256),(257,257),(258,258),(259,259),(260,260),(261,261),(262,262),(263,263),(264,264),(265,265),(266,266),(267,267),(268,268),(269,269),(270,270),(271,271),(272,272),(273,273),(274,274)

```

• oltp_delete

```

root@Nodot:/home/noe  x  root@Nodot:/home/noe  x  +  -
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     2780
    other:                    1765929
    total:                   1768709
  transactions:              1768709 (29477.10 per sec.)
  queries:                  1768709 (29477.10 per sec.)
  ignored errors:            0      (0.00 per sec.)
  reconnects:                0      (0.00 per sec.)

General statistics:
  total time:                 60.0011s
  total number of events:     1768709

Latency (ms):
  min:                         0.01
  avg:                        0.07
  max:                       111.32
  95th percentile:             0.27
  sum:                      119343.71

Threads fairness:
  events (avg/stddev):       884354.5000/30166.50
  execution time (avg/stddev): 59.6719/0.01

root@Nodot:/home/noe#

```

• oltp_insert

```
root@Nodot:/home/noe  x  root@Nodot:/home/noe  x  +  v

Threads started!

SQL statistics:
  queries performed:
    read:          0
    write:        34563
    other:         0
    total:       34563
  transactions: 34563 (576.00 per sec.)
  queries:      34563 (576.00 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0035s
  total number of events: 34563

Latency (ms):
  min:            1.87
  avg:            3.47
  max:           58.92
  95th percentile: 4.49
  sum:          119863.26

Threads fairness:
  events (avg/stddev): 17281.5000/4.50
  execution time (avg/stddev): 59.9316/0.00

root@Nodot:/home/noe#
```

- oltp_point_select

```
root@Nodot:/home/noe  x  root@Nodot:/home/noe  x  +  v

Threads started!

SQL statistics:
  queries performed:
    read:        2839592
    write:         0
    other:         0
    total:       2839592
  transactions: 2839592 (47323.29 per sec.)
  queries:      2839592 (47323.29 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0008s
  total number of events: 2839592

Latency (ms):
  min:            0.00
  avg:            0.04
  max:            3.96
  95th percentile: 0.19
  sum:          119190.62

Threads fairness:
  events (avg/stddev): 1419796.0000/520495.00
  execution time (avg/stddev): 59.5953/0.14

root@Nodot:/home/noe#
```

- oltp_read_only

```
root@Nodot:/home/noe x root@Nodot:/home/noe x + -
```

Threads started!

SQL statistics:

queries performed:	
read:	2450770
write:	0
other:	350110
total:	2800880
transactions:	175055 (2917.45 per sec.)
queries:	2800880 (46679.22 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0011s
total number of events:	175055

Latency (ms):

min:	0.33
avg:	0.68
max:	15.75
95th percentile:	2.97
sum:	119845.02

Threads fairness:

events (avg/stddev):	87527.5000/18929.50
execution time (avg/stddev):	59.9225/0.01

```
root@Nodot:/home/noe#
```

• oltp_read_write

```
root@Nodot:/home/noe x root@Nodot:/home/noe x + -
```

Threads started!

SQL statistics:

queries performed:	
read:	242494
write:	62048
other:	41875
total:	346417
transactions:	17320 (288.63 per sec.)
queries:	346417 (5772.83 per sec.)
ignored errors:	1 (0.02 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0069s
total number of events:	17320

Latency (ms):

min:	2.67
avg:	6.93
max:	34.98
95th percentile:	11.65
sum:	119942.30

Threads fairness:

events (avg/stddev):	8660.0000/162.00
execution time (avg/stddev):	59.9712/0.00

```
root@Nodot:/home/noe#
```

• oltp_update_index

```
root@Nodot:/home/noe      x  root@Nodot:/home/noe      x  +  -  □  ×  
Threads started!  
  
SQL statistics:  
    queries performed:  
        read:                      0  
        write:                     35003  
        other:                     2563  
        total:                     37566  
    transactions:                37566 (626.06 per sec.)  
    queries:                     37566 (626.06 per sec.)  
    ignored errors:              0 (0.00 per sec.)  
    reconnects:                  0 (0.00 per sec.)  
  
General statistics:  
    total time:                 60.0024s  
    total number of events:     37566  
  
Latency (ms):  
    min:                         0.03  
    avg:                        3.19  
    max:                        19.81  
    95th percentile:             4.25  
    sum:                        119934.22  
  
Threads fairness:  
    events (avg/stddev):       18783.0000/3.00  
    execution time (avg/stddev): 59.9671/0.00  
  
root@Nodot:/home/noe#
```

- oltp_update_non_index

```
root@Nodot:/home/noe      x  root@Nodot:/home/noe      x  +  -  □  ×  
Threads started!  
  
SQL statistics:  
    queries performed:  
        read:                      0  
        write:                     34721  
        other:                     2559  
        total:                     37280  
    transactions:                37280 (621.29 per sec.)  
    queries:                     37280 (621.29 per sec.)  
    ignored errors:              0 (0.00 per sec.)  
    reconnects:                  0 (0.00 per sec.)  
  
General statistics:  
    total time:                 60.0030s  
    total number of events:     37280  
  
Latency (ms):  
    min:                         0.03  
    avg:                        3.22  
    max:                        22.46  
    95th percentile:             4.41  
    sum:                        119936.80  
  
Threads fairness:  
    events (avg/stddev):       18640.0000/5.00  
    execution time (avg/stddev): 59.9684/0.00  
  
root@Nodot:/home/noe#
```

- oltp_write_only

```
root@Nodot:/home/noe# 
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     100417
    other:                     54527
    total:                     154944
  transactions:               25824 (430.35 per sec.)
  queries:                   154944 (2582.10 per sec.)
  ignored errors:             0 (0.00 per sec.)
  reconnects:                 0 (0.00 per sec.)

General statistics:
  total time:                60.0054s
  total number of events:     25824

Latency (ms):
  min:                        2.04
  avg:                         4.64
  max:                        80.81
  95th percentile:              6.67
  sum:                       119913.93

Threads fairness:
  events (avg/stddev):       12912.0000/30.00
  execution time (avg/stddev): 59.9570/0.00

root@Nodot:/home/noe#
```

- select_random_points

```
root@Nodot:/home/noe# 
Threads started!

SQL statistics:
  queries performed:
    read:                      1640041
    write:                      0
    other:                      0
    total:                      1640041
  transactions:               1640041 (27331.66 per sec.)
  queries:                   1640041 (27331.66 per sec.)
  ignored errors:             0 (0.00 per sec.)
  reconnects:                 0 (0.00 per sec.)

General statistics:
  total time:                60.0028s
  total number of events:     1640041

Latency (ms):
  min:                        0.04
  avg:                         0.07
  max:                        4.40
  95th percentile:              0.25
  sum:                       119184.68

Threads fairness:
  events (avg/stddev):       820020.5000/112963.50
  execution time (avg/stddev): 59.5923/0.05

root@Nodot:/home/noe#
```

- select_random_ranges

```
root@Nodot:/home/noe x root@Nodot:/home/noe x + -
```

Threads started!

SQL statistics:

queries performed:	
read:	1343391
write:	0
other:	0
total:	1343391
transactions:	1343391 (22388.98 per sec.)
queries:	1343391 (22388.98 per sec.)
ignored errors:	0 (0.00 per sec.)
reconnects:	0 (0.00 per sec.)

General statistics:

total time:	60.0010s
total number of events:	1343391

Latency (ms):

min:	0.04
avg:	0.09
max:	31.03
95th percentile:	0.28
sum:	119179.67

Threads fairness:

events (avg/stddev):	671695.5000/99881.50
execution time (avg/stddev):	59.5898/0.06

```
root@Nodot:/home/noe#
```

Prueba con 1 core, 3 nodo y 60 segundos

Código del tercer nodo

Sincronización

```

root@nodo1:/home/noe      x  root@nodo2:/home/noe      x  root@nodo3:/home/noe      x  +  v
inet6 ::1/128 scope host noprefixroute
    valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:80:6d:db brd ff:ff:ff:ff:ff:ff
    inet 192.168.56.107/24 metric 100 brd 192.168.56.255 scope global dynamic enp0s3
        valid_lft 489sec preferred_lft 489sec
    inet6 fe80::a00:27ff:fe80:6ddb%64 scope link
        valid_lft forever preferred_lft forever
root@nodo3:/home/noe# vi /etc/mysql/mariadb.conf.d/60-galera.cnf
root@nodo3:/home/noe# galera_new_cluster
root@nodo3:/home/noe# sudo systemctl restart mariadb
root@nodo3:/home/noe# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+-----+
| Variable_name | Value |
+-----+
| wsrep_cluster_size | 3   |
+-----+
root@nodo3:/home/noe# vi /etc/mysql/mariadb.conf.d/60-galera.cnf
root@nodo3:/home/noe# mysql -u root --execute="SHOW GLOBAL STATUS WHERE Variable_name IN ('wsrep_ready', 'wsrep_cluster_size', 'wsrep_cluster_status', 'wsrep_connected');"
+-----+
| Variable_name | Value |
+-----+
| wsrep_cluster_size | 3   |
| wsrep_cluster_status | Primary |
| wsrep_connected | ON   |
| wsrep_ready | ON   |
+-----+
root@nodo3:/home/noe#

```

• bulk_insert

```

root@nodo1:/home/noe      x  root@nodo2:/home/noe      x  root@nodo3:/home/noe      x  +  v
root@nodo3:/home/noe# sysbench --threads=1 --time=5 --rate=0 --db-driver=mysql --mysql-user=root --events=0 bulk_insert
  run
sysbench 1.0.20 (using system LuAJIT 2.1.0-beta3)

Running the test with following options:
Number of threads: 1
Initializing random number generator from current time

Initializing worker threads...
Threads started!

FATAL: mysql_drv_query() returned error 1136 (Column count doesn't match value count at row 1) for query 'INSERT INTO sb
test1 VALUES(1,1),(2,2),(3,3),(4,4),(5,5),(6,6),(7,7),(8,8),(9,9),(10,10),(11,11),(12,12),(13,13),(14,14),(15,15),(16,16
),(17,17),(18,18),(19,19),(20,20),(21,21),(22,22),(23,23),(24,24),(25,25),(26,26),(27,27),(28,28),(29,29),(30,30),(31,31
),(32,32),(33,33),(34,34),(35,35),(36,36),(37,37),(38,38),(39,39),(40,40),(41,41),(42,42),(43,43),(44,44),(45,45),(46,46
),(47,47),(48,48),(49,49),(50,50),(51,51),(52,52),(53,53),(54,54),(55,55),(56,56),(57,57),(58,58),(59,59),(60,60),(61,61
),(62,62),(63,63),(64,64),(65,65),(66,66),(67,67),(68,68),(69,69),(70,70),(71,71),(72,72),(73,73),(74,74),(75,75),(76,76
),(77,77),(78,78),(79,79),(80,80),(81,81),(82,82),(83,83),(84,84),(85,85),(86,86),(87,87),(88,88),(89,89),(90,90),(91,91
),(92,92),(93,93),(94,94),(95,95),(96,96),(97,97),(98,98),(99,99),(100,100),(101,101),(102,102),(103,103),(104,104),(105
),(106,106),(107,107),(108,108),(109,109),(110,110),(111,111),(112,112),(113,113),(114,114),(115,115),(116,116),(117
),(117),(118,118),(119,119),(120,120),(121,121),(122,122),(123,123),(124,124),(125,125),(126,126),(127,127),(128,128),(129
),(129),(130,130),(131,131),(132,132),(133,133),(134,134),(135,135),(136,136),(137,137),(138,138),(139,139),(140,140),(141
),(141),(142,142),(143,143),(144,144),(145,145),(146,146),(147,147),(148,148),(149,149),(150,150),(151,151),(152,152),(153
),(153),(154,154),(155,155),(156,156),(157,157),(158,158),(159,159),(160,160),(161,161),(162,162),(163,163),(164,164),(165
),(165),(166,166),(167,167),(168,168),(169,169),(170,170),(171,171),(172,172),(173,173),(174,174),(175,175),(176,176),(177
),(177),(178,178),(179,179),(180,180),(181,181),(182,182),(183,183),(184,184),(185,185),(186,186),(187,187),(188,188),(189
),(189),(190,190),(191,191),(192,192),(193,193),(194,194),(195,195),(196,196),(197,197),(198,198),(199,199),(200,200),(201
),(201),(202,202),(203,203),(204,204),(205,205),(206,206),(207,207),(208,208),(209,209),(210,210),(211,211),(212,212),(213
)
```

• oltp_delete

```
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     1310
    other:                    1132824
    total:                   1134134
  transactions:             1134134 (18900.07 per sec.)
  queries:                  1134134 (18900.07 per sec.)
  ignored errors:           0      (0.00 per sec.)
  reconnects:                0      (0.00 per sec.)

General statistics:
  total time:               60.0006s
  total number of events:   1134134

Latency (ms):
  min:                      0.02
  avg:                      0.05
  max:                     30.64
  95th percentile:          0.05
  sum:                   59264.02

Threads fairness:
  events (avg/stddev):     1134134.0000/0.00
  execution time (avg/stddev): 59.2640/0.00

root@nodo3:/home/noe#
```

- oltp_insert

```
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     3957
    other:                     0
    total:                   3957
  transactions:             3957 (65.92 per sec.)
  queries:                  3957 (65.92 per sec.)
  ignored errors:           0      (0.00 per sec.)
  reconnects:                0      (0.00 per sec.)

General statistics:
  total time:               60.0238s
  total number of events:   3957

Latency (ms):
  min:                      4.00
  avg:                      15.16
  max:                     788.04
  95th percentile:          37.56
  sum:                   59970.54

Threads fairness:
  events (avg/stddev):     3957.0000/0.00
  execution time (avg/stddev): 59.9705/0.00

root@nodo3:/home/noe#
```

- oltp_point_select

```
Threads started!

SQL statistics:
  queries performed:
    read:          2058305
    write:         0
    other:         0
    total:        2058305
  transactions:  2058305 (34303.33 per sec.)
  queries:      2058305 (34303.33 per sec.)
  ignored errors: 0      (0.00 per sec.)
  reconnects:   0      (0.00 per sec.)

General statistics:
  total time:       60.0016s
  total number of events: 2058305

Latency (ms):
  min:            0.02
  avg:            0.03
  max:           11.35
  95th percentile: 0.03
  sum:          58239.09

Threads fairness:
  events (avg/stddev): 2058305.0000/0.00
  execution time (avg/stddev): 58.2391/0.00

root@nodo3:/home/noe#
```

- oltp_read_only

```
Threads started!

SQL statistics:
  queries performed:
    read:          1654940
    write:         0
    other:        236420
    total:        1891360
  transactions:  118210 (1970.10 per sec.)
  queries:      1891360 (31521.58 per sec.)
  ignored errors: 0      (0.00 per sec.)
  reconnects:   0      (0.00 per sec.)

General statistics:
  total time:       60.0007s
  total number of events: 118210

Latency (ms):
  min:            0.31
  avg:            0.51
  max:           14.31
  95th percentile: 1.10
  sum:          59840.54

Threads fairness:
  events (avg/stddev): 118210.0000/0.00
  execution time (avg/stddev): 59.8405/0.00

root@nodo3:/home/noe#
```

- oltp_read_write

```
Threads started!

SQL statistics:
  queries performed:
    read:          56924
    write:         13568
    other:        10828
    total:        81320
  transactions:  4066  (67.63 per sec.)
  queries:      81320 (1352.65 per sec.)
  ignored errors: 0   (0.00 per sec.)
  reconnects:   0   (0.00 per sec.)

General statistics:
  total time:      60.1161s
  total number of events: 4066

Latency (ms):
  min:            5.72
  avg:           14.77
  max:          555.99
  95th percentile: 30.26
  sum:          60066.98

Threads fairness:
  events (avg/stddev): 4066.0000/0.00
  execution time (avg/stddev): 60.0670/0.00

root@nodo3:/home/noe#
```

- oltp_update_index

```
Threads started!

SQL statistics:
  queries performed:
    read:          0
    write:         3954
    other:        822
    total:        4776
  transactions:  4776  (79.53 per sec.)
  queries:      4776 (79.53 per sec.)
  ignored errors: 0   (0.00 per sec.)
  reconnects:   0   (0.00 per sec.)

General statistics:
  total time:      60.0427s
  total number of events: 4776

Latency (ms):
  min:            0.02
  avg:           12.56
  max:          809.86
  95th percentile: 33.72
  sum:          60008.71

Threads fairness:
  events (avg/stddev): 4776.0000/0.00
  execution time (avg/stddev): 60.0087/0.00

root@nodo3:/home/noe#
```

- oltp_update_non_index

```
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     4588
    other:                     944
    total:                     5532
  transactions:               5532  (92.19 per sec.)
  queries:                   5532  (92.19 per sec.)
  ignored errors:            0   (0.00 per sec.)
  reconnects:                 0   (0.00 per sec.)

General statistics:
  total time:                60.0067s
  total number of events:     5532

Latency (ms):
  min:                        0.03
  avg:                        10.84
  max:                        568.13
  95th percentile:            29.72
  sum:                       59968.22

Threads fairness:
  events (avg/stddev):      5532.0000/0.00
  execution time (avg/stddev): 59.9682/0.00

root@nodo3:/home/noe#
```

- oltp_write_only

```
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     19548
    other:                     13236
    total:                     32784
  transactions:               5464  (91.06 per sec.)
  queries:                   32784  (546.34 per sec.)
  ignored errors:            0   (0.00 per sec.)
  reconnects:                 0   (0.00 per sec.)

General statistics:
  total time:                60.0046s
  total number of events:     5464

Latency (ms):
  min:                        3.98
  avg:                        10.97
  max:                        207.41
  95th percentile:             24.38
  sum:                       59941.88

Threads fairness:
  events (avg/stddev):      5464.0000/0.00
  execution time (avg/stddev): 59.9419/0.00

root@nodo3:/home/noe#
```

- select_random_points

```
Threads started!

SQL statistics:
  queries performed:
    read:          32078
    write:         0
    other:         0
    total:        32078
  transactions: 32078 (534.61 per sec.)
  queries:      32078 (534.61 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0007s
  total number of events: 32078

Latency (ms):
  min:            0.42
  avg:           1.87
  max:          23.25
  95th percentile: 4.03
  sum:         59932.59

Threads fairness:
  events (avg/stddev): 32078.0000/0.00
  execution time (avg/stddev): 59.9326/0.00

root@nodo3:/home/noe#
```

- select_random_ranges

```
Threads started!

SQL statistics:
  queries performed:
    read:          45230
    write:         0
    other:         0
    total:        45230
  transactions: 45230 (753.79 per sec.)
  queries:      45230 (753.79 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0019s
  total number of events: 45230

Latency (ms):
  min:            0.22
  avg:           1.33
  max:          13.19
  95th percentile: 3.19
  sum:         59938.42

Threads fairness:
  events (avg/stddev): 45230.0000/0.00
  execution time (avg/stddev): 59.9384/0.00

root@nodo3:/home/noe#
```

Prueba con 2 core, 3 nodo y 60 segundos

- bulk_insert

```

root@nodo1:/home/noe  X  root@nodo2:/home/noe  X  root@nodo3:/home/noe  X  +  -
,(92,92),(93,93),(94,94),(95,95),(96,96),(97,97),(98,98),(99,99),(100,100),(101,101),(102,102),(103,103),(104,104),(105,105),(106,106),(107,107),(108,108),(109,109),(110,110),(111,111),(112,112),(113,113),(114,114),(115,115),(116,116),(117,117),(118,118),(119,119),(120,120),(121,121),(122,122),(123,123),(124,124),(125,125),(126,126),(127,127),(128,128),(129,129),(130,130),(131,131),(132,132),(133,133),(134,134),(135,135),(136,136),(137,137),(138,138),(139,139),(140,140),(141,141),(142,142),(143,143),(144,144),(145,145),(146,146),(147,147),(148,148),(149,149),(150,150),(151,151),(152,152),(153,153),(154,154),(155,155),(156,156),(157,157),(158,158),(159,159),(160,160),(161,161),(162,162),(163,163),(164,164),(165,165),(166,166),(167,167),(168,168),(169,169),(170,170),(171,171),(172,172),(173,173),(174,174),(175,175),(176,176),(177,177),(178,178),(179,179),(180,180),(181,181),(182,182),(183,183),(184,184),(185,185),(186,186),(187,187),(188,188),(189,189),(190,190),(191,191),(192,192),(193,193),(194,194),(195,195),(196,196),(197,197),(198,198),(199,199),(200,200),(201,201),(202,202),(203,203),(204,204),(205,205),(206,206),(207,207),(208,208),(209,209),(210,210),(211,211),(212,212),(213,213),(214,214),(215,215),(216,216),(217,217),(218,218),(219,219),(220,220),(221,221),(222,222),(223,223),(224,224),(225,225),(226,226),(227,227),(228,228),(229,229),(230,230),(231,231),(232,232),(233,233),(234,234),(235,235),(236,236),(237,237),(238,238),(239,239),(240,240),(241,241),(242,242),(243,243),(244,244),(245,245),(246,246),(247,247),(248,248),(249,249),(250,250),(251,251),(252,252),(253,253),(254,254),(255,255),(256,256),(257,257),(258,258),(259,259),(260,260),(261,261),(262,262),(263,263),(264,264),(265,265),(266,266),(267,267),(268,268),(269,269),(270,270),(271,271),(272,272),(273,273),(274,274),(275,275),(276,276),(277,277),(278,278),(279,279),(280,280),(281,281),(282,282),(283,283),(284,284),(285,285),(286,286),(287,287),(288,288),(289,289),(290,290),(291,291),(292,292),(293,293),(294,294),(295,295),(296,296),(297,297),(298,298),(299,299),(300,300),(301,301),(302,302),(303,303),(304,304),(305,305),(306,306),(307,307),(308,308),(309,309),(310,310),(311,311),(312,312),(313,313),(314,314),(315,315),(316,316),(317,317),(318,318),(319,319),(320,320),(321,321),(322,322),(323,323),(324,324),(325,325),(326,326),(327,327),(328,328),(329,329),(330,330),(331,331),(332,332),(333,333),(334,334),(335,335),(336,336),(337,337),(338,338),(339,339),(340,340),(341,341),(342,342),(343,343),(344,344),(345,345),(346,346),(347,347),(348,348),(349,349),(350,350),(351,351),(352,352),(353,353),(354,354),(355,355),(356,356),(357,357),(358,358),(359,359),(360,360),(361,361),(362,362),(363,363),(364,364),(365,365),(366,366),(367,367),(368,368),(369,369),(370,370),(371,371),(372,372),(373,373),(374,374),(375,375),(376,376),(377,377),(378,378),(379,379),(380,380),(381,381),(382,382),(383,383),(384,384),(385,385),(386,386),(387,387),(388,388),(389,389),(390,390),(391,391),(392,392),(393,393),(394,394),(395,395),(396,396),(397,397),(398,398),(399,399),(400,400),(401,401),(402,402),(403,403),(404,404),(405,405),(406,406),(407,407),(408,408),(409,409),(410,410),(411,411),(412,412),(413,413),(414,414),(415,415),(416,416),(417,417),(418,418),(419,419),4FATAL: 'thread_run' function failed: /usr/share/sysbench/bulk_insert.lua:38: db_bulk_insert_next() failed
root@nodo3:/home/noe#

```

• oltp_delete

```

root@nodo1:/home/noe  X  root@nodo2:/home/noe  X  root@nodo3:/home/noe  X  +  -
Threads started!
SQL statistics:
  queries performed:
    read:                      0
    write:                     1771
    other:                    1479663
    total:                   1481434
  transactions:             1481434 (24689.73 per sec.)
  queries:                  1481434 (24689.73 per sec.)
  ignored errors:           0      (0.00 per sec.)
  reconnects:                0      (0.00 per sec.)

General statistics:
  total time:               60.0006s
  total number of events:   1481434

Latency (ms):
  min:                      0.02
  avg:                      0.08
  max:                     291.48
  95th percentile:          0.08
  sum:                     118415.77

Threads fairness:
  events (avg/stddev):    740717.0000/2495.00
  execution time (avg/stddev): 59.2079/0.00
root@nodo3:/home/noe#

```

• oltp_insert

```
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     7209
    other:                     0
    total:                     7209
  transactions:               7209  (120.13 per sec.)
  queries:                   7209  (120.13 per sec.)
  ignored errors:            0   (0.00 per sec.)
  reconnects:                 0   (0.00 per sec.)

General statistics:
  total time:                60.0073s
  total number of events:     7209

Latency (ms):
  min:                       3.80
  avg:                        16.63
  max:                       330.66
  95th percentile:           42.61
  sum:                      119880.02

Threads fairness:
  events (avg/stddev):      3604.5000/1.50
  execution time (avg/stddev): 59.9400/0.00

root@nodo3:/home/noe# |
```

- oltp_point_select

```
Threads started!

SQL statistics:
  queries performed:
    read:                      2057878
    write:                     0
    other:                     0
    total:                     2057878
  transactions:               2057878  (34292.76 per sec.)
  queries:                   2057878  (34292.76 per sec.)
  ignored errors:            0   (0.00 per sec.)
  reconnects:                 0   (0.00 per sec.)

General statistics:
  total time:                60.0033s
  total number of events:     2057878

Latency (ms):
  min:                       0.02
  avg:                        0.06
  max:                       28.75
  95th percentile:           0.07
  sum:                      118276.53

Threads fairness:
  events (avg/stddev):      1028939.0000/1194.00
  execution time (avg/stddev): 59.1383/0.00

root@nodo3:/home/noe# |
```

- oltp_read_only

```
Threads started!

SQL statistics:
  queries performed:
    read:          1567230
    write:         0
    other:        223890
    total:       1791120
  transactions: 111945 (1865.59 per sec.)
  queries:      1791120 (29849.49 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0030s
  total number of events: 111945

Latency (ms):
  min:            0.31
  avg:           1.07
  max:          28.29
  95th percentile: 3.43
  sum:        119841.31

Threads fairness:
  events (avg/stddev): 55972.5000/241.50
  execution time (avg/stddev): 59.9207/0.00

root@nodo3:/home/noe#
```

- oltp_read_write

```
Threads started!

SQL statistics:
  queries performed:
    read:          91266
    write:         22188
    other:        16924
    total:       130378
  transactions: 6518 (108.61 per sec.)
  queries:      130378 (2172.59 per sec.)
  ignored errors: 1 (0.02 per sec.)
  reconnects:   0 (0.00 per sec.)

General statistics:
  total time:      60.0077s
  total number of events: 6518

Latency (ms):
  min:            5.87
  avg:           18.40
  max:          395.51
  95th percentile: 35.59
  sum:        119938.22

Threads fairness:
  events (avg/stddev): 3259.0000/6.00
  execution time (avg/stddev): 59.9691/0.00

root@nodo3:/home/noe#
```

- oltp_update_index

```
root@nodo1:/home/noe  x  root@nodo2:/home/noe  x  root@nodo3:/home/noe  +  -  X
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     6491
    other:                     1075
    total:                     7566
  transactions:               7566  (126.09 per sec.)
  queries:                   7566  (126.09 per sec.)
  ignored errors:             0   (0.00 per sec.)
  reconnects:                 0   (0.00 per sec.)

General statistics:
  total time:                60.0042s
  total number of events:     7566

Latency (ms):
  min:                        0.02
  avg:                        15.85
  max:                        280.45
  95th percentile:            49.21
  sum:                       119924.82

Threads fairness:
  events (avg/stddev):      3783.0000/30.00
  execution time (avg/stddev): 59.9624/0.00

root@nodo3:/home/noe#
```

- oltp_update_non_index

```
root@nodo1:/home/noe  x  root@nodo2:/home/noe  x  root@nodo3:/home/noe  +  -  X
Threads started!

SQL statistics:
  queries performed:
    read:                      0
    write:                     7242
    other:                     1160
    total:                     8402
  transactions:               8402  (140.01 per sec.)
  queries:                   8402  (140.01 per sec.)
  ignored errors:             0   (0.00 per sec.)
  reconnects:                 0   (0.00 per sec.)

General statistics:
  total time:                60.0082s
  total number of events:     8402

Latency (ms):
  min:                        0.02
  avg:                        14.27
  max:                        368.83
  95th percentile:            40.37
  sum:                       119924.62

Threads fairness:
  events (avg/stddev):      4201.0000/14.00
  execution time (avg/stddev): 59.9623/0.00

root@nodo3:/home/noe#
```

- oltp_write_only

```
root@nodo1:/home/noe  X root@nodo2:/home/noe  X root@nodo3:/home/noe  X + v
Threads started!

SQL statistics:
  queries performed:
    read:          0
    write:        24011
    other:       15421
    total:      39432
  transactions:   6572  (109.51 per sec.)
  queries:     39432  (657.07 per sec.)
  ignored errors: 0  (0.00 per sec.)
  reconnects: 0  (0.00 per sec.)

General statistics:
  total time:      60.0094s
  total number of events: 6572

Latency (ms):
  min:            4.26
  avg:           18.25
  max:          251.05
  95th percentile: 45.79
  sum:         119922.54

Threads fairness:
  events (avg/stddev): 3286.0000/4.00
  execution time (avg/stddev): 59.9613/0.00

root@nodo3:/home/noe#
```

- select_random_points

```
root@nodo1:/home/noe  X root@nodo2:/home/noe  X root@nodo3:/home/noe  X + v
Threads started!

SQL statistics:
  queries performed:
    read:        792044
    write:        0
    other:        0
    total:      792044
  transactions: 792044 (13199.42 per sec.)
  queries:     792044 (13199.42 per sec.)
  ignored errors: 0  (0.00 per sec.)
  reconnects: 0  (0.00 per sec.)

General statistics:
  total time:      60.0047s
  total number of events: 792044

Latency (ms):
  min:            0.04
  avg:           0.15
  max:           23.56
  95th percentile: 0.24
  sum:         119251.09

Threads fairness:
  events (avg/stddev): 396022.0000/24251.00
  execution time (avg/stddev): 59.6255/0.03

root@nodo3:/home/noe#
```

- select_random_ranges

```
Threads started!

SQL statistics:
  queries performed:
    read:          687856
    write:         0
    other:         0
    total:        687856
  transactions:  687856 (11462.35 per sec.)
  queries:      687856 (11462.35 per sec.)
  ignored errors: 0      (0.00 per sec.)
  reconnects:   0      (0.00 per sec.)

General statistics:
  total time:       60.0085s
  total number of events: 687856

Latency (ms):
  min:            0.04
  avg:           0.17
  max:          24.97
  95th percentile: 0.29
  sum:        119215.99

Threads fairness:
  events (avg/stddev): 343928.0000/11871.00
  execution time (avg/stddev): 59.6080/0.03

root@nodo3:/home/noe#
```

Analisis de los clusters y pruebas

A partir de los distintos escenarios evaluados, se pueden extraer algunas conclusiones clave:

- **Escalabilidad:** Al aumentar el número de nodos, la capacidad de procesamiento de consultas distribuidas mejoró, especialmente en pruebas de solo lectura (`oltp_read_only`).
- **CPU vs. Número de Nodos:** Al incrementar los núcleos de CPU en un solo nodo, el rendimiento mejoró hasta cierto punto, pero el beneficio de agregar más nodos fue mayor en términos de redundancia y disponibilidad.
- **Operaciones de Escritura:** Los escenarios con múltiples nodos mostraron un ligero aumento en la latencia para escrituras (`oltp_write_only` y `bulk_insert`) debido a la replicación síncrona de Galera.
- **Lectura Distribuida:** La carga de trabajo de solo lectura escaló eficientemente con más nodos, reduciendo la carga en cada servidor.

Conclusion

El clúster con Galera y MariaDB mostró mejoras significativas en la redundancia y distribución de carga. Sin embargo, se debe considerar el impacto en la latencia de escritura cuando se agregan más nodos. Para entornos con alta demanda de lectura, aumentar el número de nodos mejora notablemente el rendimiento.