



Universidad del Caribe

2000

CANCUN, QUINTANA ROO, MÉXICO

CONOCIMIENTO Y CULTURA PARA EL DESARROLLO HUMANO

Instalar Galera 4 Cluster con MariaDB en Linux

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Fecha de entrega:

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Instrucciones:

- Montar base de datos en MariaDB
- Realizar pruebas con sysbench
- Lanzar una prueba de cada set de pruebas en sysbench utilizando 1 core y 2 cores
- Medir el número de transacciones que soporta su infraestructura en un periodo de 1 minuto para cada set de pruebas.

```
Windows PowerShell
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Prueba la nueva tecnología PowerShell multiplataforma https://aka.ms/pscore6

PS C:\Users\valea> ssh mel@127.0.0.1 -p 3232
mel@127.0.0.1's password:
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-41-generic x86_64)

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

System information as of Wed Feb 19 03:40:10 PM UTC 2025

System load:          0.0
Usage of /:            5.7% of 48.91GB
Memory usage:         6%
Swap usage:           0%
Processes:            152
Users logged in:      1
IPv4 address for enp0s3: 10.0.2.15
IPv6 address for enp0s3: fd00::a00:27ff:fe73:2a26

 * Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
   just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

220 updates can be applied immediately.
67 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your Internet connection or proxy settings

Last login: Wed Feb 19 15:29:00 2025 from 192.168.56.1
mel@node0:~$ sudo su
[sudo] password for mel:
root@node0:/home/mel# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+-----+
| Variable_name | Value |
+-----+
+-----+
```

```

Enter password:
+-----+
| Variable_name | Value |
+-----+
| wsrep_cluster_size | 1 |
+-----+

root@node0:/home/mel# apt -y install sysbench
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  liblua5.1-2 liblua5.1-common libpq5
The following NEW packages will be installed:
  liblua5.1-2 liblua5.1-common libpq5 sysbench
0 upgraded, 4 newly installed, 0 to remove and 287 not upgraded.
Need to get 581 kB of archives.
After this operation, 1,641 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble/universe amd64 liblua5.1-2-common all 2.1-20230410-1build1 [48.6 kB]
Get:2 http://archive.ubuntu.com/ubuntu noble/universe amd64 liblua5.1-2 amd64 2.1-20230410-1build1 [277 kB]
Get:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libpq5 amd64 16.6-0ubuntu0.24.04.1 [141 kB]
Get:4 http://archive.ubuntu.com/ubuntu noble/universe amd64 sysbench amd64 1.0.20+ds-6build2 [114 kB]
Fetched 581 kB in 26s (22.3 kB/s)
Selecting previously unselected package liblua5.1-2-common.
(Reading database ... 84908 files and directories currently installed.)
Preparing to unpack .../liblua5.1-2-common_2.1-20230410-1build1_all.deb ...
Unpacking liblua5.1-2-common (2.1-20230410-1build1) ...
Selecting previously unselected package liblua5.1-2:amd64.
Preparing to unpack .../liblua5.1-2:amd64_2.1-20230410-1build1_amd64.deb ...
Unpacking liblua5.1-2:amd64 (2.1-20230410-1build1) ...
Selecting previously unselected package libpq5:amd64.
Preparing to unpack .../libpq5_16.6-0ubuntu0.24.04.1_amd64.deb ...
Unpacking libpq5:amd64 (16.6-0ubuntu0.24.04.1) ...
Selecting previously unselected package sysbench.
Preparing to unpack .../sysbench_1.0.20+ds-6build2_amd64.deb ...
Unpacking sysbench (1.0.20+ds-6build2) ...
Setting up libpq5:amd64 (16.6-0ubuntu0.24.04.1) ...
Setting up liblua5.1-2-common (2.1-20230410-1build1) ...
Setting up liblua5.1-2:amd64 (2.1-20230410-1build1) ...
Setting up sysbench (1.0.20+ds-6build2) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...
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.

```

Nota: Aquí inicializamos el cluster e instalamos sysbench

```

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@node0:/home/mel# mysql -uroot -p -e "create database sbtest"
Enter password:
root@node0:/home/mel# 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@node0:/home/mel# sysbench --threads=1 --time=5 --rate=0 --db-driver=mysql --mysql-user=root --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!

SQL statistics:
  queries performed:
    read:          41720
    write:         0
    other:         5960
    total:        47680
  transactions:    2980 (595.64 per sec.)
  queries:        47680 (9530.19 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects:     0 (0.00 per sec.)

General statistics:
  total time:      5.0015s
  total number of events: 2980

Latency (ms):
  min:            1.10
  avg:            1.68
  max:           13.55
  95th percentile: 2.26
  sum:           4995.30

Threads fairness:
  events (avg/stddev): 2980.0000/0.00

```

Set de pruebas de sysbench:


```

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), (420, 420)
failed
root@node0:/home/mel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_delete 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!

SQL statistics:
  queries performed:
    read:                0
    write:               5124
    other:              732093
    total:              737217
  transactions:        737217 (12286.59 per sec.)
  queries:             737217 (12286.59 per sec.)
  ignored errors:       0 (0.00 per sec.)
  reconnects:          0 (0.00 per sec.)

General statistics:
  total time:          60.0003s
  total number of events: 737217

Latency (ms):
  min:                 0.04
  avg:                  0.08
  max:                 124.42
  95th percentile:    0.11
  sum:                 59650.91

Threads fairness:
  events (avg/stddev): 737217.0000/0.00
  execution time (avg/stddev): 59.6509/0.00

```

```

  min:                 0.04
  avg:                  0.08
  max:                 124.42
  95th percentile:    0.11
  sum:                 59650.91

Threads fairness:
  events (avg/stddev): 737217.0000/0.00
  execution time (avg/stddev): 59.6509/0.00

root@node0:/home/mel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_delete 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!

SQL statistics:
  queries performed:
    read:                0
    write:               491
    other:             1358855
    total:             1359346
  transactions:        1359346 (22654.54 per sec.)
  queries:             1359346 (22654.54 per sec.)
  ignored errors:       0 (0.00 per sec.)
  reconnects:          0 (0.00 per sec.)

General statistics:
  total time:          60.0009s
  total number of events: 1359346

Latency (ms):
  min:                 0.04
  avg:                  0.09
  max:                 28.41
  95th percentile:    0.13
  sum:                119278.63

Threads fairness:
  events (avg/stddev): 679673.0000/12919.00
  execution time (avg/stddev): 59.6393/0.00

```

- **oltp_insert:**


```

min: 0.04
avg: 0.09
max: 28.41
95th percentile: 0.13
sum: 119278.63

Threads fairness:
  events (avg/stddev): 679673.0000/12919.00
  execution time (avg/stddev): 59.6393/0.00

root@node0:/home/mel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_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!

SQL statistics:
  queries performed:
    read: 0
    write: 31678
    other: 0
    total: 31678
  transactions: 31678 (527.92 per sec.)
  queries: 31678 (527.92 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0044s
  total number of events: 31678

Latency (ms):
  min: 0.74
  avg: 1.89
  max: 76.98
  95th percentile: 3.30
  sum: 59903.56

Threads fairness:
  events (avg/stddev): 31678.0000/0.00
  execution time (avg/stddev): 59.9036/0.00

  95th percentile: 3.30
  sum: 59903.56

Threads fairness:
  events (avg/stddev): 31678.0000/0.00
  execution time (avg/stddev): 59.9036/0.00

root@node0:/home/mel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_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!

SQL statistics:
  queries performed:
    read: 0
    write: 35068
    other: 0
    total: 35068
  transactions: 35068 (584.42 per sec.)
  queries: 35068 (584.42 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0031s
  total number of events: 35068

Latency (ms):
  min: 1.35
  avg: 3.42
  max: 83.90
  95th percentile: 5.37
  sum: 119833.48

Threads fairness:
  events (avg/stddev): 17534.0000/4.00
  execution time (avg/stddev): 59.9167/0.00

```

- **oltp_point_select:**

```

min: 1.35
avg: 3.42
max: 83.90
95th percentile: 5.37
sum: 119833.48

Threads fairness:
  events (avg/stddev): 17534.0000/4.00
  execution time (avg/stddev): 59.9167/0.00

root@node0:/home/mcl# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_point_select 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!

SQL statistics:
  queries performed:
    read: 788853
    write: 0
    other: 0
    total: 788853
  transactions: 788853 (13146.70 per sec.)
  queries: 788853 (13146.70 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: 788853

Latency (ms):
  min: 0.04
  avg: 0.08
  max: 22.60
  95th percentile: 0.12
  sum: 59595.62

Threads fairness:
  events (avg/stddev): 788853.0000/0.00
  execution time (avg/stddev): 59.5956/0.00

min: 0.04
avg: 0.08
max: 22.60
95th percentile: 0.12
sum: 59595.62

Threads fairness:
  events (avg/stddev): 788853.0000/0.00
  execution time (avg/stddev): 59.5956/0.00

root@node0:/home/mcl# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_point_select 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!

SQL statistics:
  queries performed:
    read: 1346638
    write: 0
    other: 0
    total: 1346638
  transactions: 1346638 (22443.29 per sec.)
  queries: 1346638 (22443.29 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: 1346638

Latency (ms):
  min: 0.04
  avg: 0.09
  max: 23.36
  95th percentile: 0.14
  sum: 119292.56

Threads fairness:
  events (avg/stddev): 673319.0000/16861.00
  execution time (avg/stddev): 59.6463/0.01

```

- **oltp_read_only:**

```

min: 0.04
avg: 0.09
max: 23.36
95th percentile: 0.14
sum: 119292.56

Threads fairness:
  events (avg/stddev): 673319.0000/16861.00
  execution time (avg/stddev): 59.6463/0.01

root@node0:/home/mel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --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!

SQL statistics:
  queries performed:
    read: 773150
    write: 0
    other: 110450
    total: 883600
  transactions: 55225 (920.38 per sec.)
  queries: 883600 (14726.00 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: 55225

Latency (ms):
  min: 0.65
  avg: 1.09
  max: 17.43
  95th percentile: 1.44
  sum: 59930.24

Threads fairness:
  events (avg/stddev): 55225.0000/0.00
  execution time (avg/stddev): 59.9302/0.00

```

```

min: 0.65
avg: 1.09
max: 17.43
95th percentile: 1.44
sum: 59930.24

Threads fairness:
  events (avg/stddev): 55225.0000/0.00
  execution time (avg/stddev): 59.9302/0.00

root@node0:/home/mel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --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: 2
Initializing random number generator from current time

Initializing worker threads...

Threads started!

SQL statistics:
  queries performed:
    read: 1225140
    write: 0
    other: 175020
    total: 1400160
  transactions: 87510 (1458.41 per sec.)
  queries: 1400160 (23334.48 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: 87510

Latency (ms):
  min: 0.66
  avg: 1.37
  max: 39.89
  95th percentile: 1.96
  sum: 119845.93

Threads fairness:
  events (avg/stddev): 43755.0000/244.00
  execution time (avg/stddev): 59.9230/0.00

```

- **oltp_read_write:**


```

min: 0.66
avg: 1.37
max: 39.89
95th percentile: 1.96
sum: 119845.93

Threads fairness:
  events (avg/stddev): 43755.0000/244.00
  execution time (avg/stddev): 59.9230/0.00

root@node0:/home/mel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_read_write 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!

SQL statistics:
  queries performed:
    read: 198884
    write: 50444
    other: 34792
    total: 284120
  transactions: 14206 (236.72 per sec.)
  queries: 284120 (4734.46 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0061s
  total number of events: 14206

Latency (ms):
  min: 2.23
  avg: 4.22
  max: 49.90
  95th percentile: 6.32
  sum: 59957.62

Threads fairness:
  events (avg/stddev): 14206.0000/0.00
  execution time (avg/stddev): 59.9576/0.00

min: 2.23
avg: 4.22
max: 49.90
95th percentile: 6.32
sum: 59957.62

Threads fairness:
  events (avg/stddev): 14206.0000/0.00
  execution time (avg/stddev): 59.9576/0.00

root@node0:/home/mel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_read_write 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!

SQL statistics:
  queries performed:
    read: 326284
    write: 89899
    other: 49931
    total: 466114
  transactions: 23304 (388.36 per sec.)
  queries: 466114 (7767.80 per sec.)
  ignored errors: 2 (0.03 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0047s
  total number of events: 23304

Latency (ms):
  min: 2.39
  avg: 5.15
  max: 280.89
  95th percentile: 7.30
  sum: 119923.04

Threads fairness:
  events (avg/stddev): 11652.0000/213.00
  execution time (avg/stddev): 59.9615/0.00

```

- **oltp_update_index:**

```

95th percentile:      7.30
sum:                  119923.04

Fairness:
events (avg/stddev):    11652.0000/213.00
execution time (avg/stddev):  59.9615/0.00

root@node0:/home/mel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_update_index 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!

SQL statistics:
queries performed:
  read:                0
  write:               31898
  other:                862
  total:               32760
transactions:          32760 (545.98 per sec.)
queries:               32760 (545.98 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: 32760

Latency (ms):
min:                   0.05
avg:                   1.83
max:                   118.00
95th percentile:      3.07
sum:                   59944.77

Fairness:
events (avg/stddev):    32760.0000/0.00
execution time (avg/stddev):  59.9448/0.00

min:                   0.05
avg:                   1.83
max:                   118.00
95th percentile:      3.07
sum:                   59944.77

Threads fairness:
events (avg/stddev):    32760.0000/0.00
execution time (avg/stddev):  59.9448/0.00

root@node0:/home/mel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_update_index 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!

SQL statistics:
queries performed:
  read:                0
  write:               36683
  other:               1009
  total:               37692
transactions:          37692 (628.17 per sec.)
queries:               37692 (628.17 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: 37692

Latency (ms):
min:                   0.06
avg:                   3.18
max:                   55.89
95th percentile:      4.57
sum:                   119908.71

Threads fairness:
events (avg/stddev):    18846.0000/10.00
execution time (avg/stddev):  59.9544/0.00

```

- **oltp_update_non_index:**

```

min: 0.06
avg: 3.18
max: 55.89
95th percentile: 4.57
sum: 119908.71

reads fairness:
  events (avg/stddev): 18846.0000/10.00
  execution time (avg/stddev): 59.9544/0.00

root@node0:/home/mel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_update_non_index 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!

SQL statistics:
  queries performed:
    read: 0
    write: 33747
    other: 874
    total: 34621
  transactions: 34621 (576.98 per sec.)
  queries: 34621 (576.98 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0005s
  total number of events: 34621

Latency (ms):
  min: 0.05
  avg: 1.73
  max: 45.48
  95th percentile: 2.52
  sum: 59939.88

reads fairness:
  events (avg/stddev): 34621.0000/0.00
  execution time (avg/stddev): 59.9399/0.00

```

```

min: 0.05
avg: 1.73
max: 45.48
95th percentile: 2.52
sum: 59939.88

Threads fairness:
  events (avg/stddev): 34621.0000/0.00
  execution time (avg/stddev): 59.9399/0.00

root@node0:/home/mel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_update_non_index 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!

SQL statistics:
  queries performed:
    read: 0
    write: 35256
    other: 1013
    total: 36269
  transactions: 36269 (604.44 per sec.)
  queries: 36269 (604.44 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: 36269

Latency (ms):
  min: 0.06
  avg: 3.31
  max: 66.59
  95th percentile: 4.57
  sum: 119900.67

Threads fairness:
  events (avg/stddev): 18134.5000/6.50
  execution time (avg/stddev): 59.9503/0.00

```

- **oltp_write_only:**

```

min: 0.00
avg: 3.31
max: 66.59
95th percentile: 4.57
sum: 119900.67

Threads fairness:
  events (avg/stddev): 18134.5000/6.50
  execution time (avg/stddev): 59.9503/0.00

root@node0:/home/mcl# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_write_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!

SQL statistics:
  queries performed:
    read: 0
    write: 97074
    other: 50544
    total: 147618
  transactions: 24603 (410.02 per sec.)
  queries: 147618 (2460.13 per sec.)
  ignored errors: 0 (0.00 per sec.)
  reconnects: 0 (0.00 per sec.)

General statistics:
  total time: 60.0027s
  total number of events: 24603

Latency (ms):
  min: 1.12
  avg: 2.44
  max: 78.64
  95th percentile: 3.55
  sum: 59919.83

Threads fairness:
  events (avg/stddev): 24603.0000/0.00
  execution time (avg/stddev): 59.9198/0.00

```

```

min: 1.12
avg: 2.44
max: 78.64
95th percentile: 3.55
sum: 59919.83

Threads fairness:
  events (avg/stddev): 24603.0000/0.00
  execution time (avg/stddev): 59.9198/0.00

root@node0:/home/mcl# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_write_only 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!

SQL statistics:
  queries performed:
    read: 0
    write: 155399
    other: 79219
    total: 234618
  transactions: 39103 (651.68 per sec.)
  queries: 234618 (3910.18 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: 39103

Latency (ms):
  min: 1.78
  avg: 3.06
  max: 129.55
  95th percentile: 3.96
  sum: 119850.69

Threads fairness:
  events (avg/stddev): 19551.5000/3.50
  execution time (avg/stddev): 59.9253/0.00

```

- **select_random_points:**

```

95th percentile:      3.86
sum:                  119850.69

threads fairness:
  events (avg/stddev):    19551.5000/1.50
  execution time (avg/stddev):  59.9253/0.00

root@node0:/home/me1# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_random_points 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!

SQL statistics:
  queries performed:
    read:                4552
    write:                0
    other:                0
    total:                4552
  transactions:          4552 (75.86 per sec.)
  queries:                4552 (75.86 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: 4552

Latency (ms):
  min:                    3.30
  avg:                    13.18
  max:                    85.63
  95th percentile:       21.89
  sum:                    59987.32

threads fairness:
  events (avg/stddev):    4552.0000/0.00
  execution time (avg/stddev):  59.9873/0.00

root@node0:/home/me1# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_random_points 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!

SQL statistics:
  queries performed:
    read:                698286
    write:                0
    other:                0
    total:                698286
  transactions:          698286 (11637.70 per sec.)
  queries:                698286 (11637.70 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: 698286

Latency (ms):
  min:                    0.08
  avg:                    0.17
  max:                    22.81
  95th percentile:       0.26
  sum:                    119214.38

Threads fairness:
  events (avg/stddev):    349143.0000/27878.00
  execution time (avg/stddev):  59.6072/0.02

```

- **select_random_ranges:**

```

      avg:                0.17
      max:                22.81
      95th percentile:    0.26
      sum:                119214.38

Threads fairness:
  events (avg/stddev):    349143.0000/27878.00
  execution time (avg/stddev): 59.6072/0.02

root@node0:/home/melf# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_random_ranges 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!

SQL statistics:
  queries performed:
    read:                6779
    write:                0
    other:                0
    total:                6779
  transactions:          6779 (112.97 per sec.)
  queries:               6779 (112.97 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: 6779

Latency (ms):
  min:                   2.35
  avg:                   8.85
  max:                   41.34
  95th percentile:      12.52
  sum:                   59983.10

Threads fairness:
  events (avg/stddev):    6779.0000/0.00
  execution time (avg/stddev): 59.9831/0.00

```

```

      min:                2.35
      avg:                8.85
      max:                41.34
      95th percentile:    12.52
      sum:                59983.10

Threads fairness:
  events (avg/stddev):    6779.0000/0.00
  execution time (avg/stddev): 59.9831/0.00

root@node0:/home/melf# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_random_ranges 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!

SQL statistics:
  queries performed:
    read:                560207
    write:                0
    other:                0
    total:                560207
  transactions:          560207 (9336.41 per sec.)
  queries:               560207 (9336.41 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: 560207

Latency (ms):
  min:                   0.08
  avg:                   0.21
  max:                   16.70
  95th percentile:      0.32
  sum:                   119151.62

Threads fairness:
  events (avg/stddev):    280103.5000/13247.50
  execution time (avg/stddev): 59.5758/0.02

```


Conclusiones:

Después de instalar Galera 4 Cluster con MariaDB en Linux, puedo decir que esta configuración ofrece un rendimiento sólido y una gran capacidad de adaptación para nuestra base de datos. Sin embargo, igual tiene mucho que ver las configuraciones iniciales, como la cantidad de memoria que se le dará a la máquina virtual, experimentando descubrí que, si afecta, al ponerle menos memoria, la capacidad que tiene de soportar la base de datos, etc., es menor que si le aumentamos y también alenta la máquina.

También puedo mencionar que Galera Cluster distribuye el trabajo entre varios nodos, lo que se traduce en un acceso más rápido a la información y una mayor capacidad para manejar grandes volúmenes de datos.

Por último, cabe recalcar que la ventaja de que tiene es que si uno de los nodos falla, no hay problema. Los demás nodos siguen funcionando sin interrupción, manteniendo nuestra base de datos en línea y protegiendo nuestros datos.