Universidad del Caribe

2000 CANCUN, QUINTANA ROO, MÉXICO

CONOCIMIENTO Y CULTURA PARA EL DESARROLLO HUMANO

PRÁCTICA

Tarea #998 Instalar Galera 4 Cluster con MariaDB en Linux

ASIGNATURA:

Cómputo de alto desempeño

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MATRÍCULA: **200300613**

PROGRAMA EDUCATIVO: **ING. EN DATOS E INTELIGENCIA ORGANIZACIONAL**

PRESENTADO A:

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Cancún, Quintana Roo

```
root@nodo1:/home/uziel# galera_new_cluster
root@nodo1:/home/uziel# netstat -tlpn
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      540/systemd-resolve
tcp        0      0 0.0.0.0:4567            0.0.0.0:*               LISTEN      3330/mariadbd
tcp        0      0 0.0.0.0:3306            0.0.0.0:*               LISTEN      3330/mariadbd
tcp        0      0 127.0.0.54:53           0.0.0.0:*               LISTEN      540/systemd-resolve
tcp6       0      0 :::22                   :::*                    LISTEN      1/init
root@nodo1:/home/uziel# mysql -u root -p -e "SHOW STATUS LIKE 'wsrep_cluster_size'"
Enter password:
+--------------------+-------+
| Variable_name      | Value |
+--------------------+-------+
| wsrep_cluster_size | 1     |
+--------------------+-------+
root@nodo1:/home/uziel# mysql -u root --execute="SHOW GLOBAL STATUS WHERE Variable_name IN ('wsrep_ready', 'wsrep_cluster_size', 'wsrep_cluster_status', 'ws
rep_connected');"
+----------------------+---------+
| Variable_name        | Value   |
+----------------------+---------+
| wsrep_cluster_size   | 1       |
| wsrep_cluster_status | Primary |
| wsrep_connected      | ON      |
| wsrep_ready          | ON      |
+----------------------+---------+
root@nodo1:/home/uziel#
```

Aquí mostramos que se ha creado de manera exitos el cluster

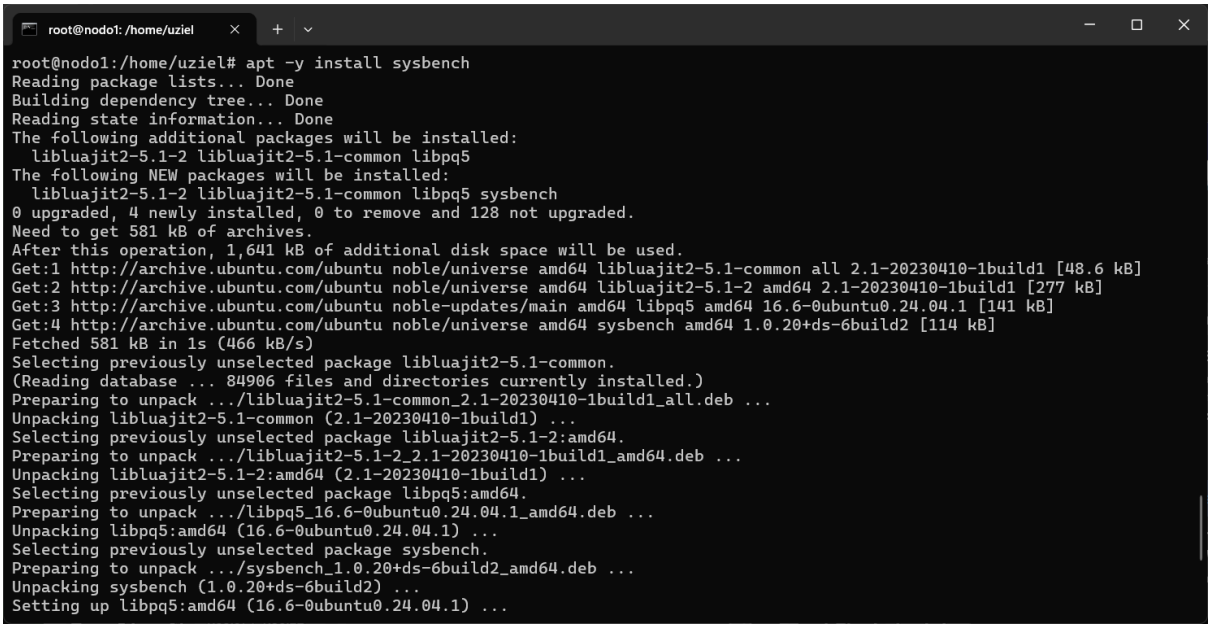
```
root@nodo1:/home/uziel# systemctl status mysql
● mariadb.service - MariaDB 10.11.8 database server
     Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; preset: enabled)
     Active: active (running) since Tue 2025-02-18 16:04:31 UTC; 12min ago
       Docs: man:mariadbd(8)
             https://mariadb.com/kb/en/library/systemd/
    Process: 3218 ExecStartPre=/usr/bin/install -m 755 -o mysql -g root -d /var/run/mysqld (code=exited, status=0/SUCCESS)
    Process: 3220 ExecStartPre=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
    Process: 3223 ExecStartPre=/bin/sh -c [ ! -e /usr/bin/galera_recovery ] && VAR= ||   VAR=`cd /usr/bin/..; /usr/bin/galera_recovery`; [ $? -eq 0 ]   && >
    Process: 3348 ExecStartPost=/bin/sh -c systemctl unset-environment _WSREP_START_POSITION (code=exited, status=0/SUCCESS)
    Process: 3350 ExecStartPost=/etc/mysql/debian-start (code=exited, status=0/SUCCESS)
   Main PID: 3330 (mariadbd)
     Status: "Taking your SQL requests now..."
      Tasks: 14 (limit: 30440)
     Memory: 105.4M (peak: 108.2M)
        CPU: 1.670s
     CGroup: /system.slice/mariadb.service
```

Se puede observar que está corriendo el cluster

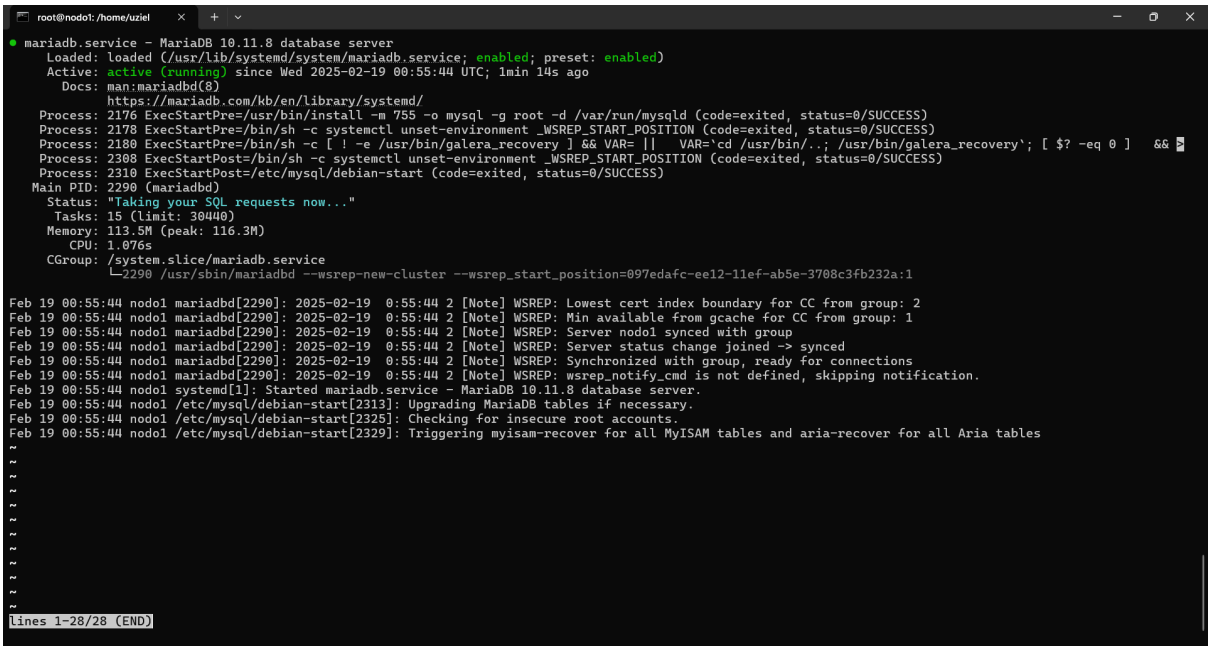
```
uziel@nodo1: ~
top - 23:55:32 up 43 min,  3 users,  load average: 0.00, 0.00, 0.00
Tasks: 101 total,   1 running, 100 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,  0.4 sy,  0.0 ni, 98.9 id,  0.0 wa,  0.0 hi,  0.8 si,  0.0 st
MiB Mem :   3916.4 total,   3447.5 free,    441.5 used,    243.0 buff/cache
MiB Swap:   2333.0 total,   2333.0 free,      0.0 used.   3475.0 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
     72 root      20   0       0      0      0 I   0.7   0.0   0:05.99 kworker/0:3-events
   1272 uziel     20   0   11912   5888   3712 R   0.3   0.1   0:00.10 top
      1 root      20   0   22124  13288   9448 S   0.0   0.3   0:02.58 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.00 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-netns
      9 root      20   0       0      0      0 I   0.0   0.0   0:07.48 kworker/0:1-cgroup_destroy
     11 root      20   0       0      0      0 I   0.0   0.0   0:00.52 kworker/u2:0-events_power_efficient
     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
     16 root      20   0       0      0      0 S   0.0   0.0   0:00.12 ksoftirqd/0
     17 root      20   0       0      0      0 I   0.0   0.0   0:00.11 rcu_preempt
     18 root      rt   0       0      0      0 S   0.0   0.0   0:00.05 migration/0
     19 root     -51   0       0      0      0 S   0.0   0.0   0:00.00 idle_inject/0
     20 root      20   0       0      0      0 S   0.0   0.0   0:00.00 cpuhp/0
     21 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kdevtmpfs
     22 root       0 -20       0      0      0 I   0.0   0.0   0:00.00 kworker/R-inet_
     24 root      20   0       0      0      0 S   0.0   0.0   0:00.00 kauditd
```

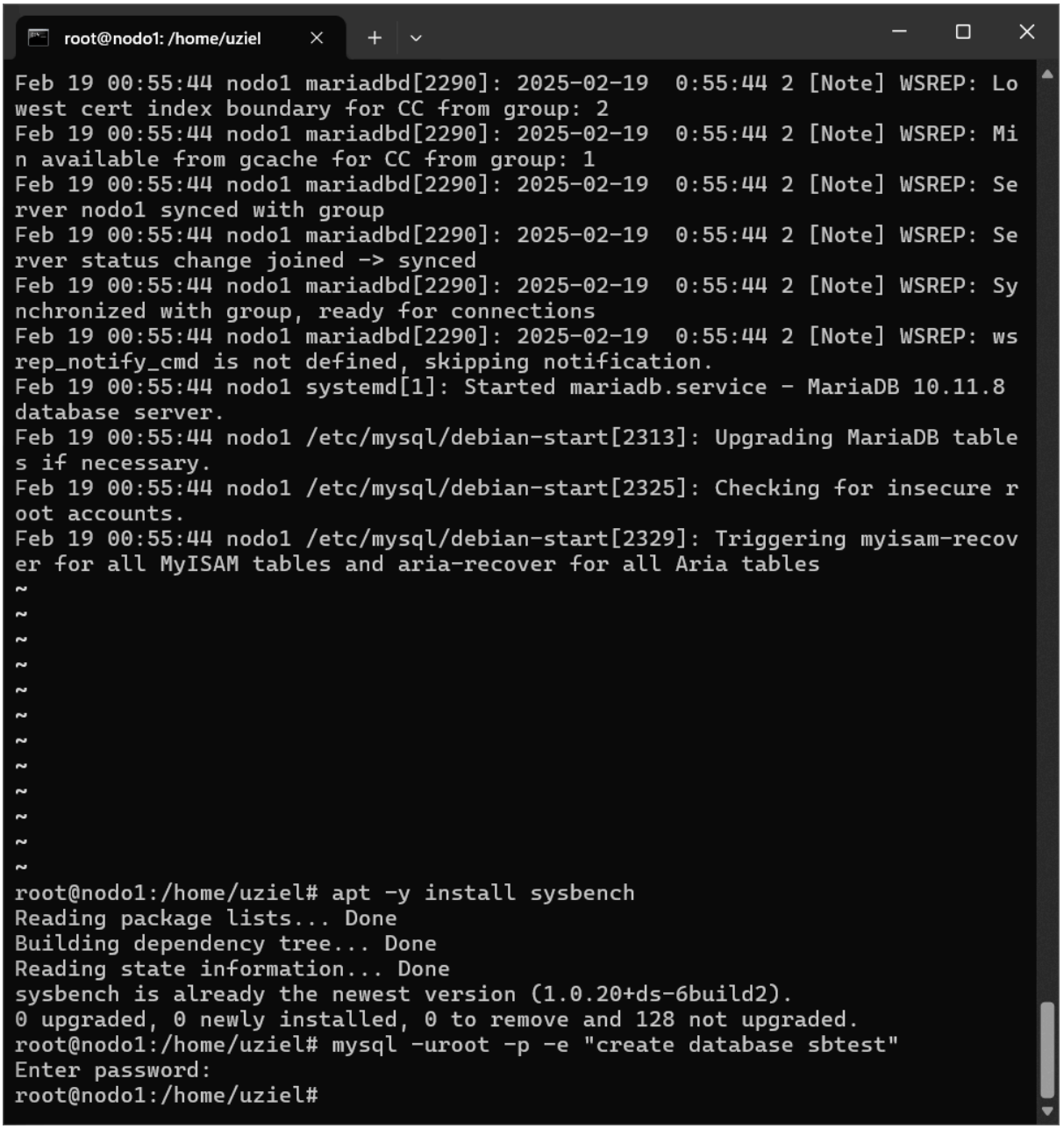
en este “top” podemos observar que no se está consumiendo muchos recursos.



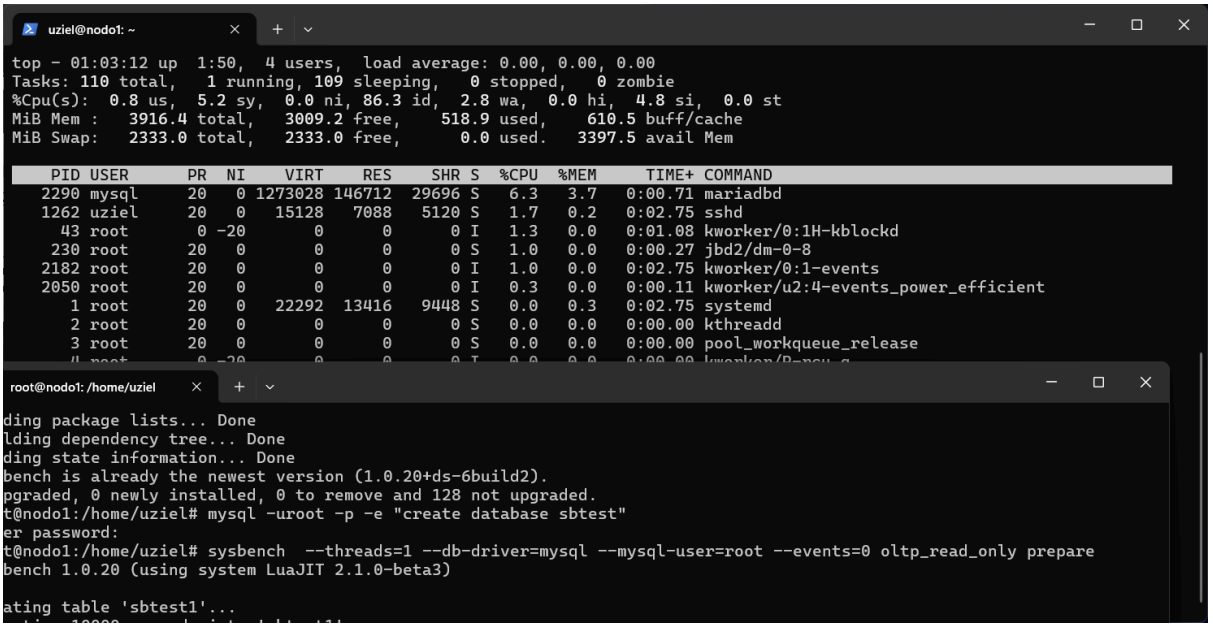
Instalación del sysbench



Comprobamos que el cluster se haya levantado de nuevo después de apagarlo

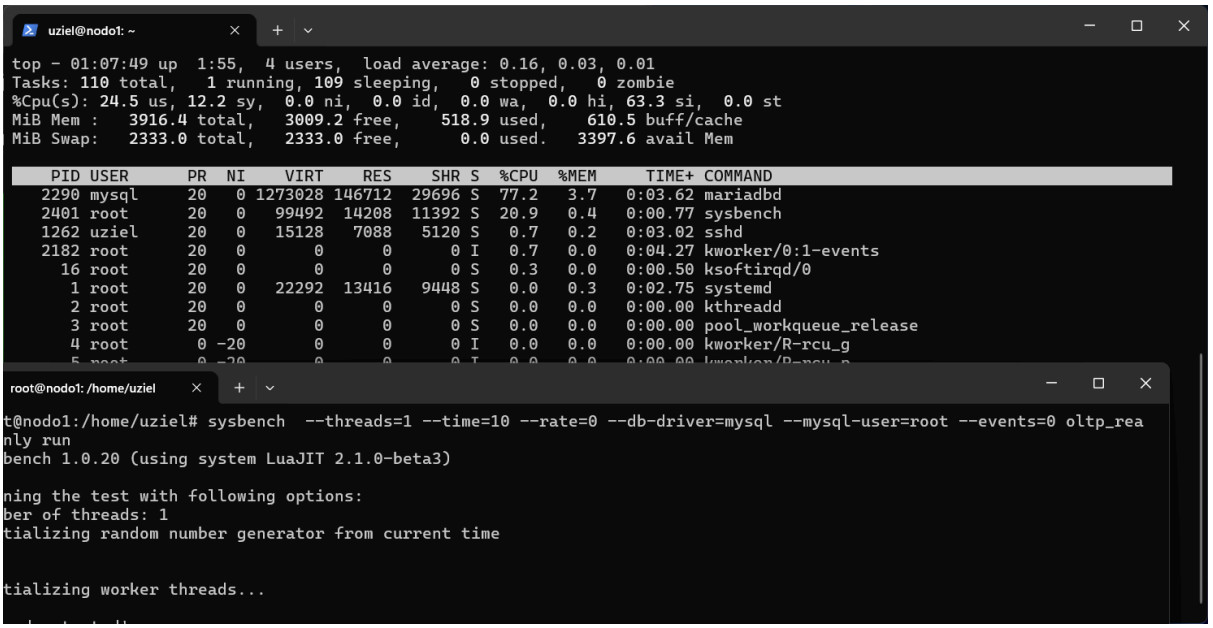


creamos la bd



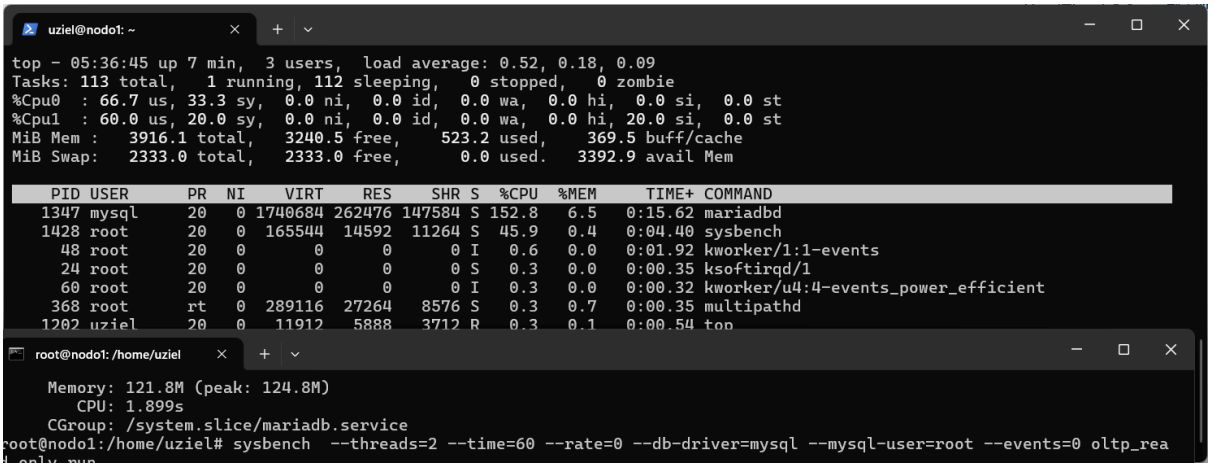
Aquí aparece el Mariadb como en el video creando los registros

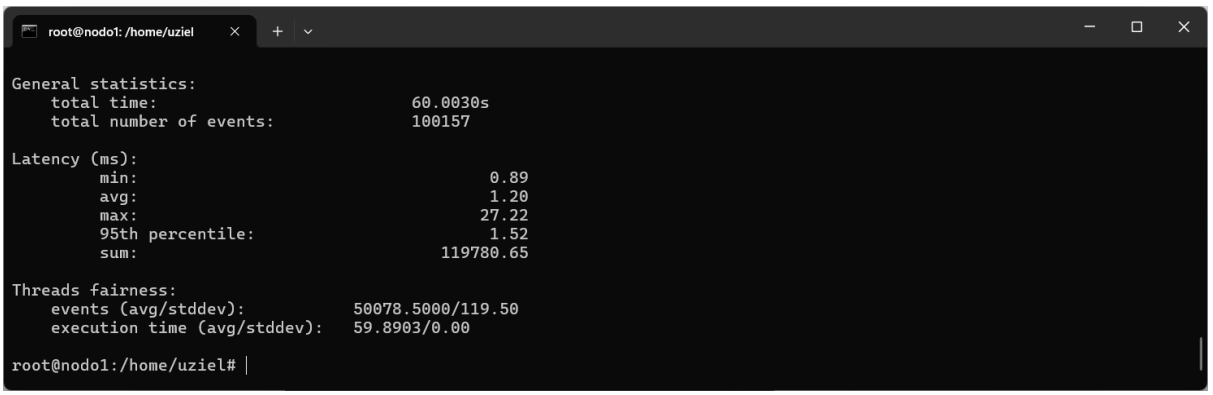
PRUEBA 1 (VIDEO)



1.- sysbench --threads=1 --time=5 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_read_only run

AHORA CON DOS CORES



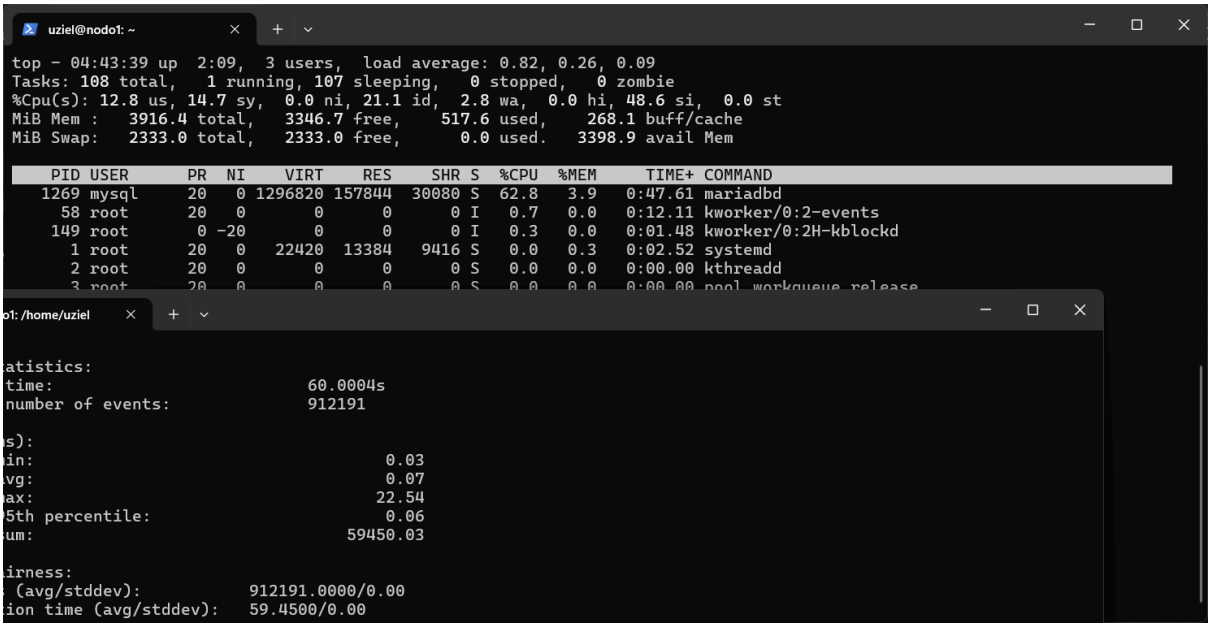


SQL statistics:

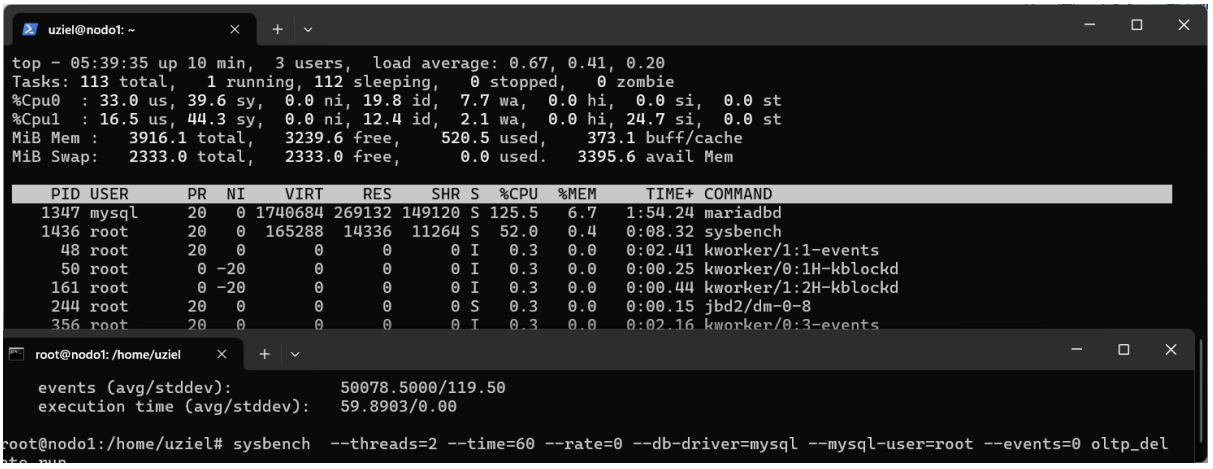
```
    queries performed:
        read:                            95466
        write:                           0
        other:                           13638
        total:                           109104
    transactions:                        6819   (681.56 per sec.)
    queries:                             109104 (10904.93 per sec.)
```

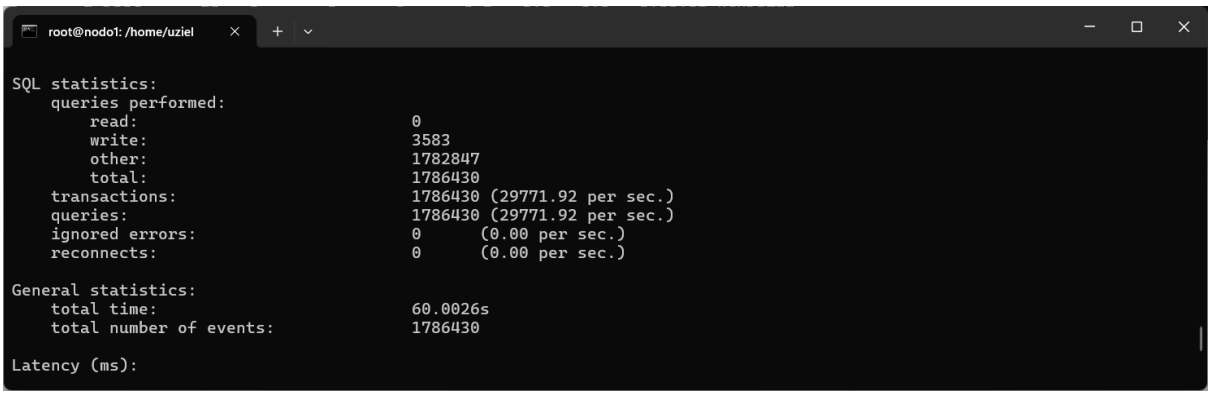
En la imagen podría notarse que solo se ocupó un 77.2% del CPU pero logré ver que ocupaba un 91% después

3.- sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_delete run

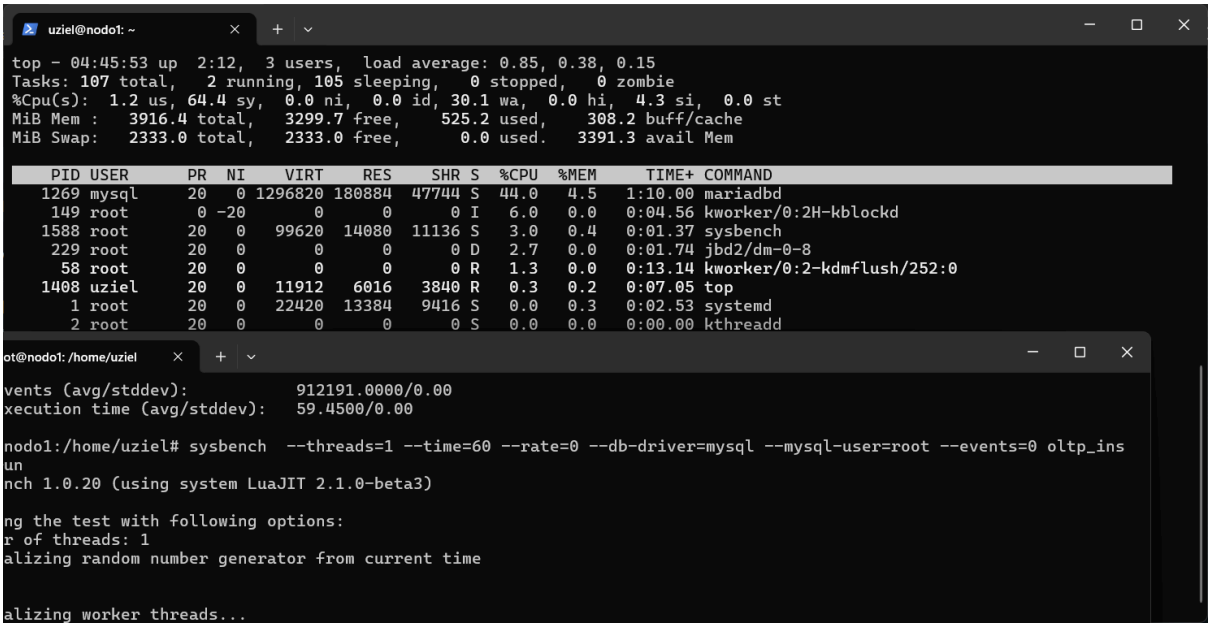


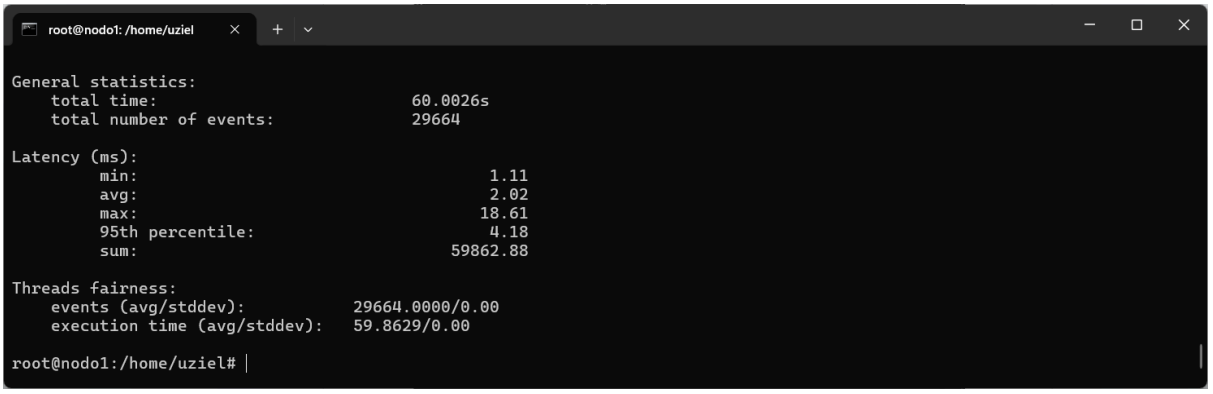
AHORA CON DOS HILOS



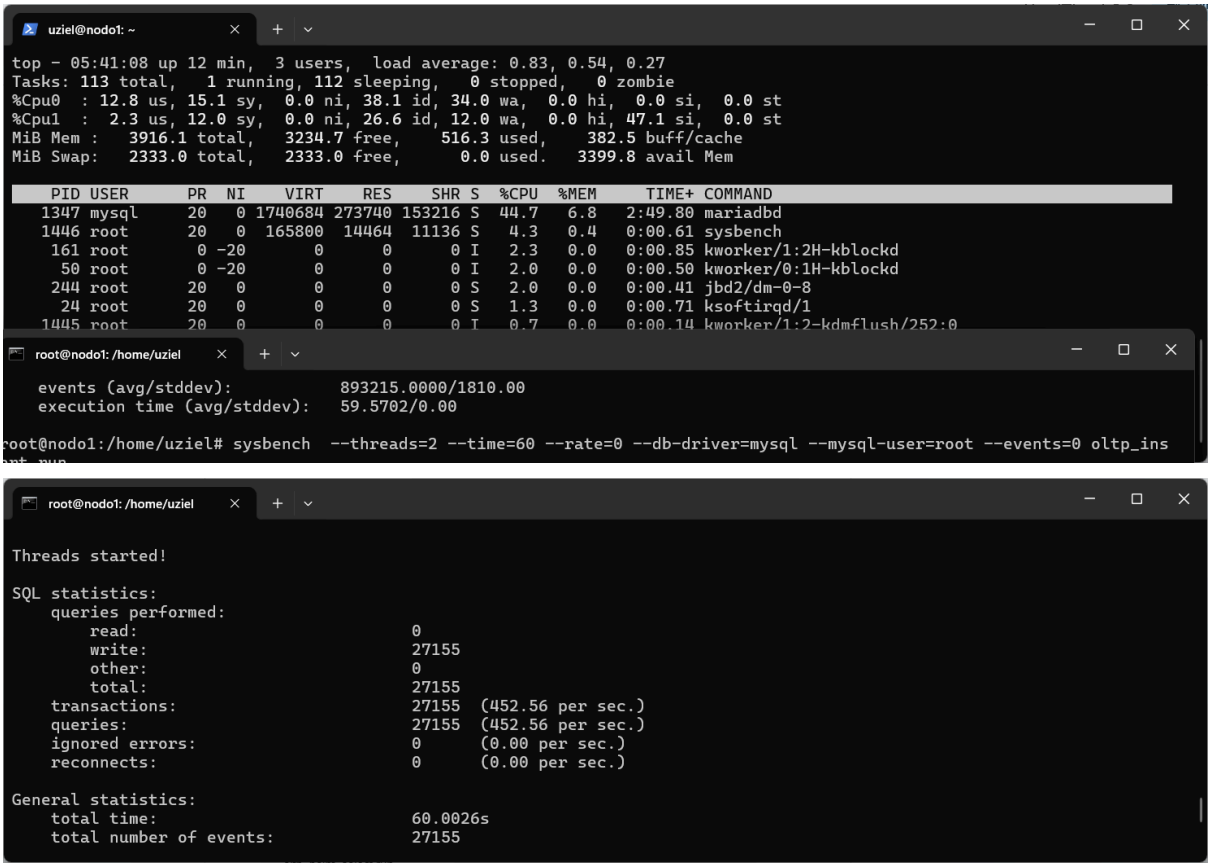


4.-sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_insert run

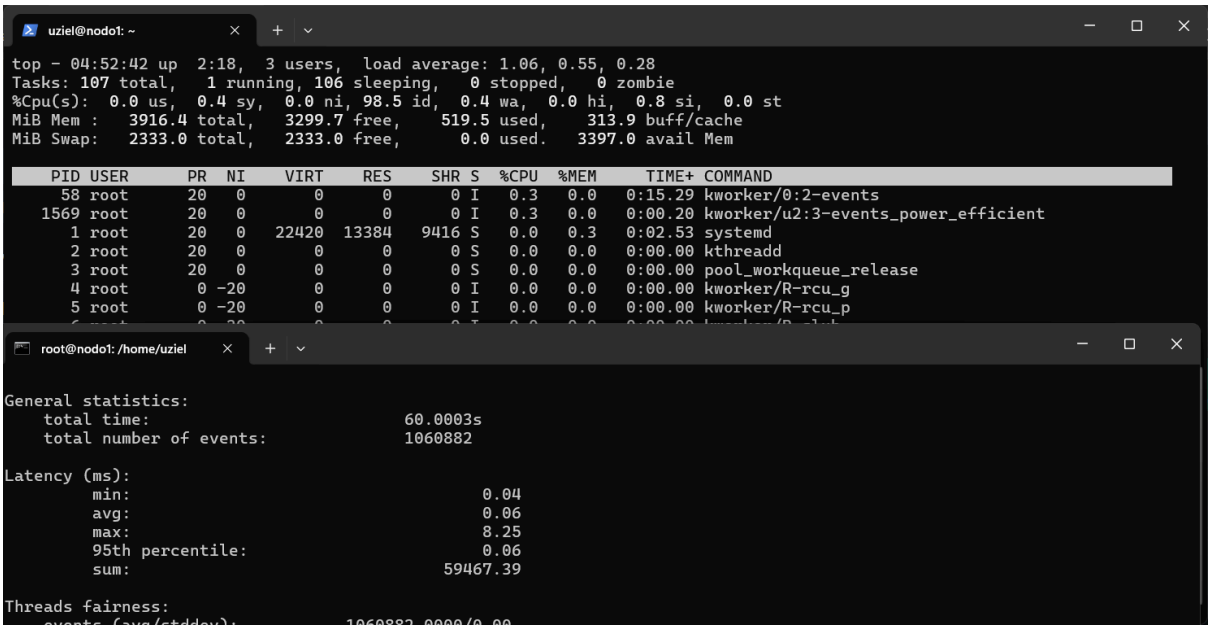




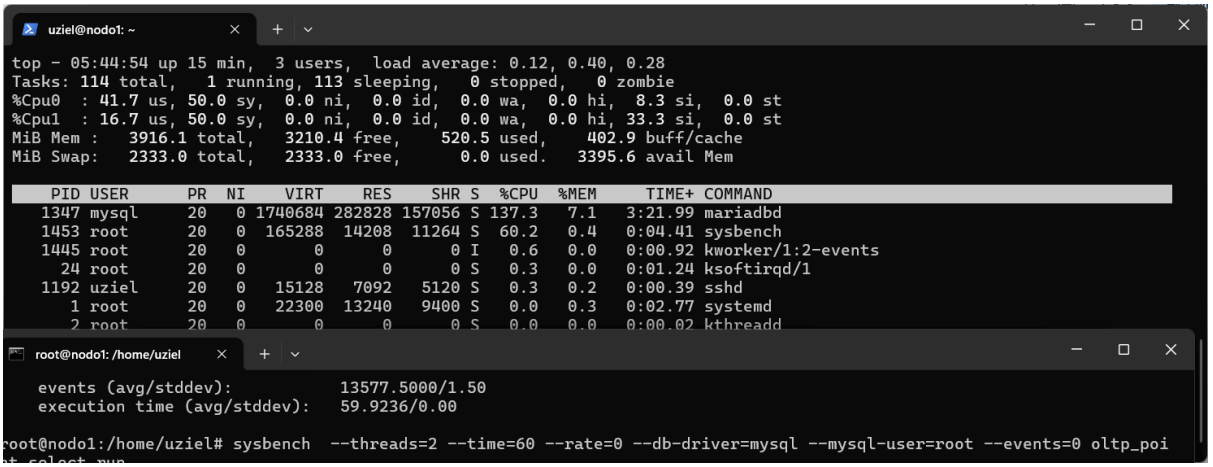
AHORA CON 2 HILOS:

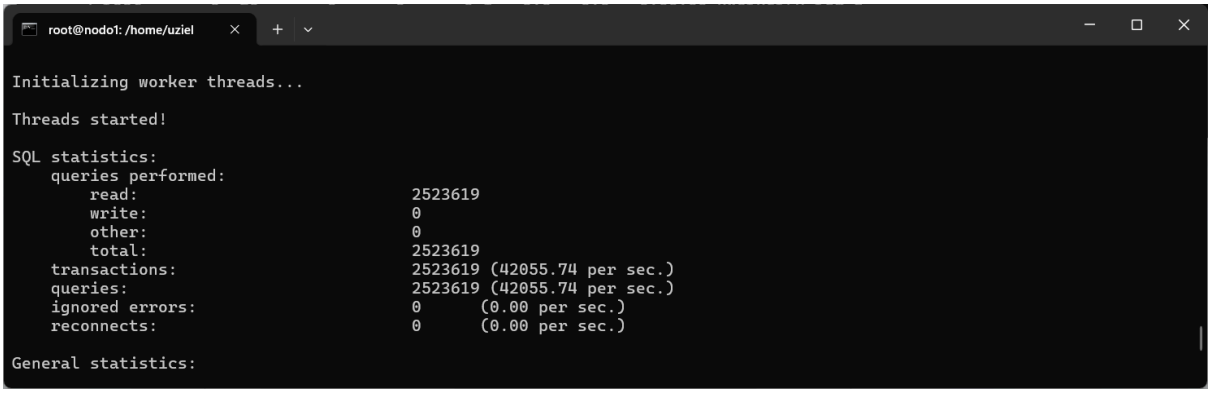


5.- sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_point_select run

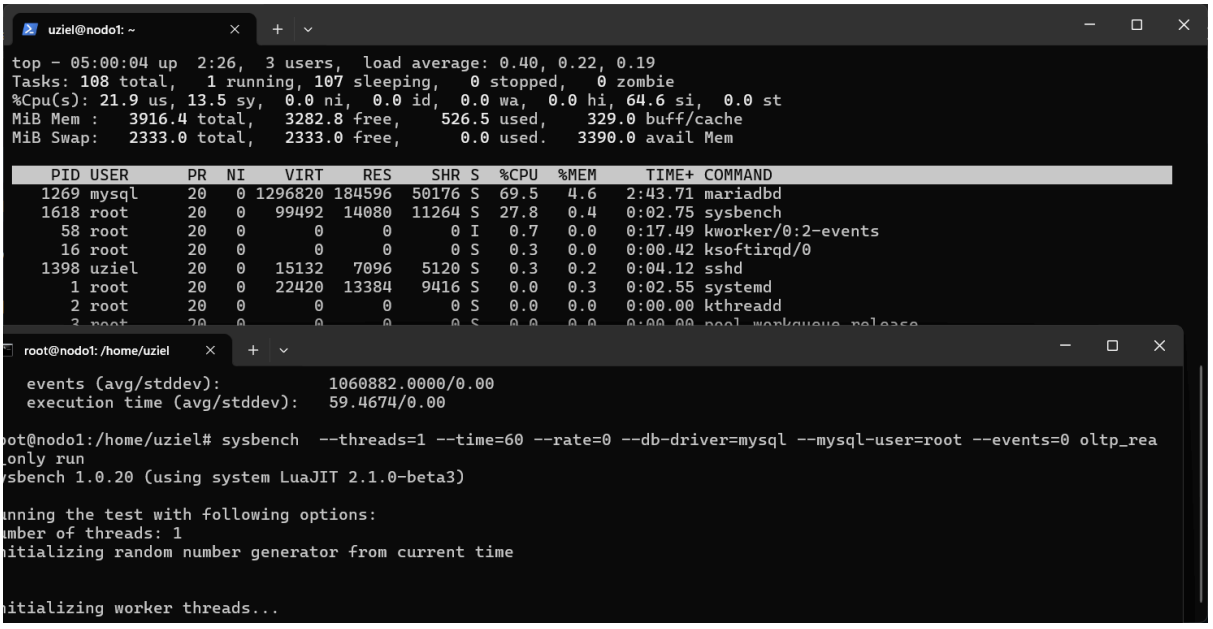


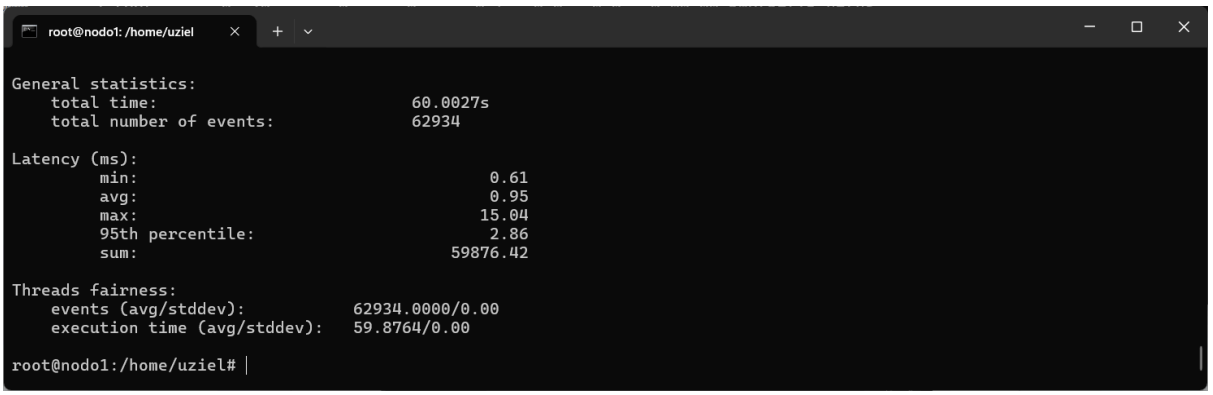
AHORA CON DOS CORE:



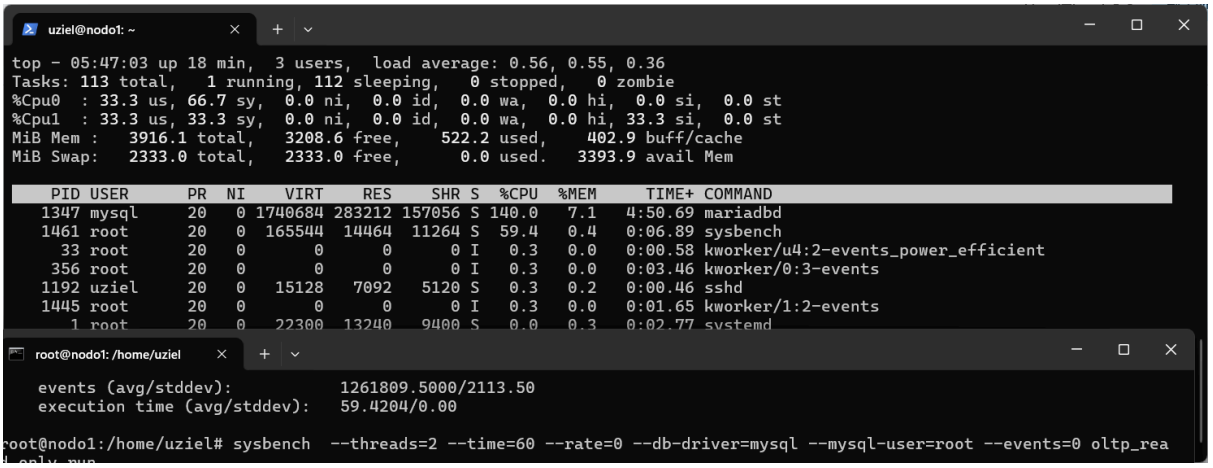


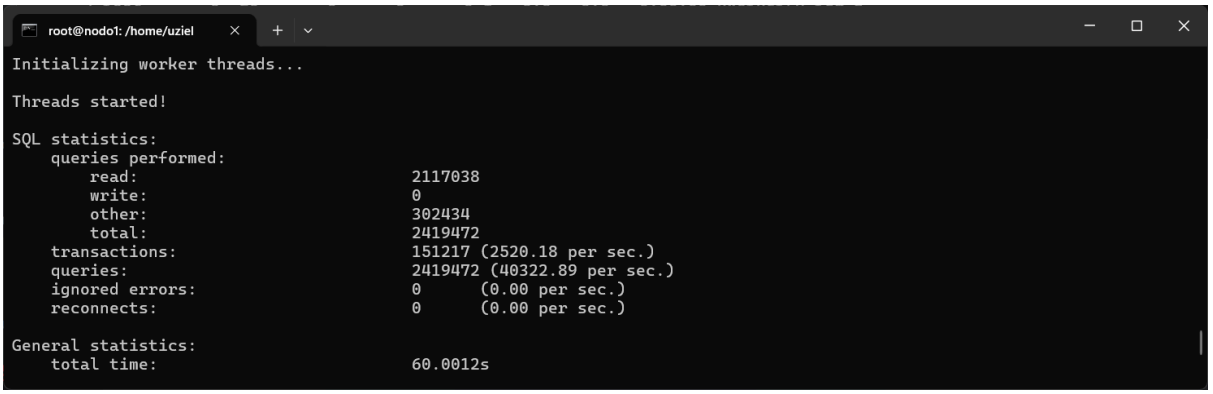
6.- sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_read_only run



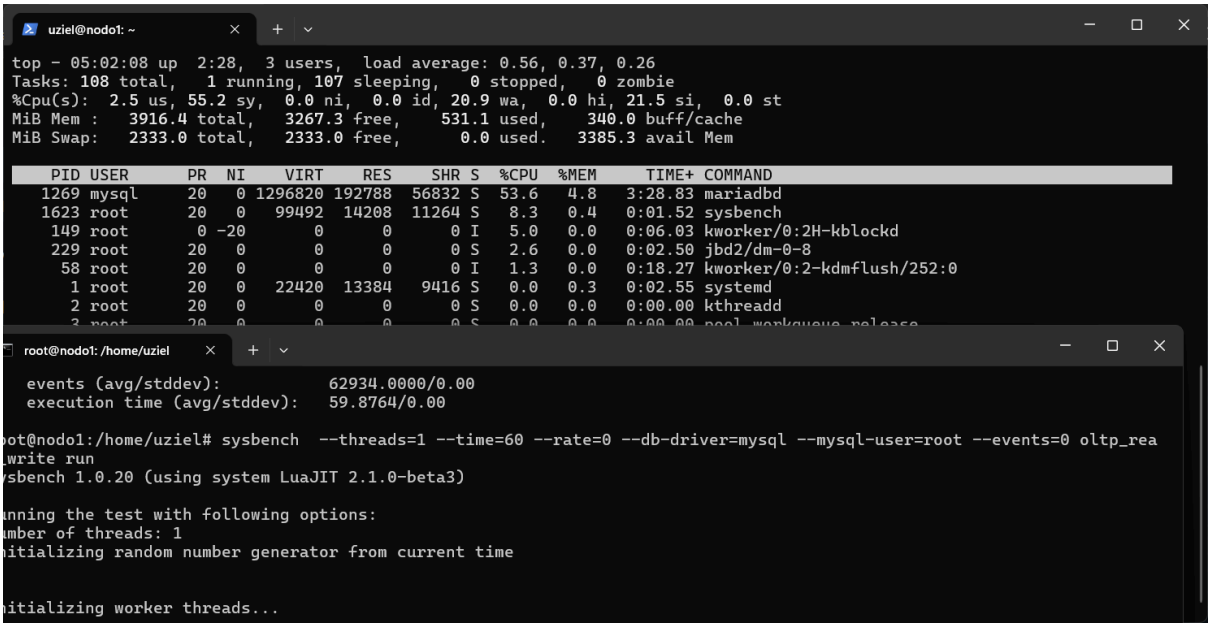


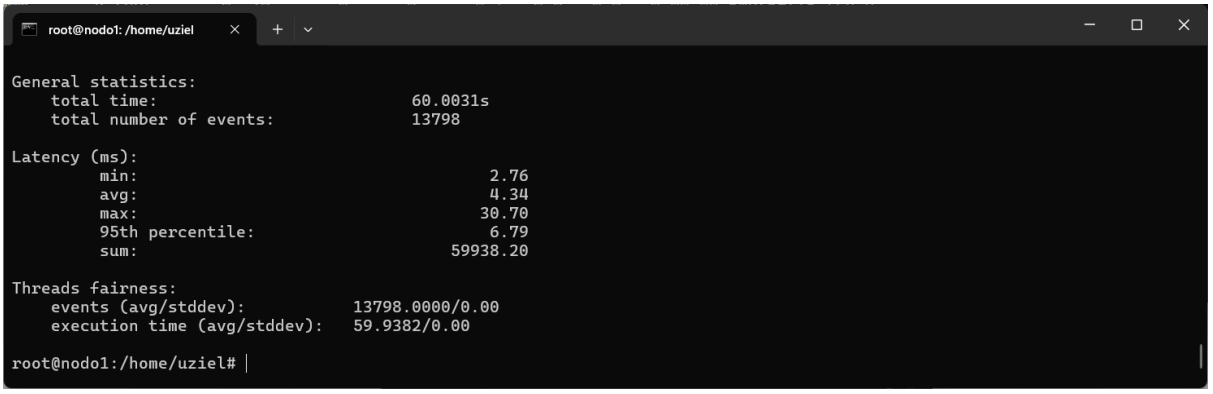
AHORA CON DOS CORE:



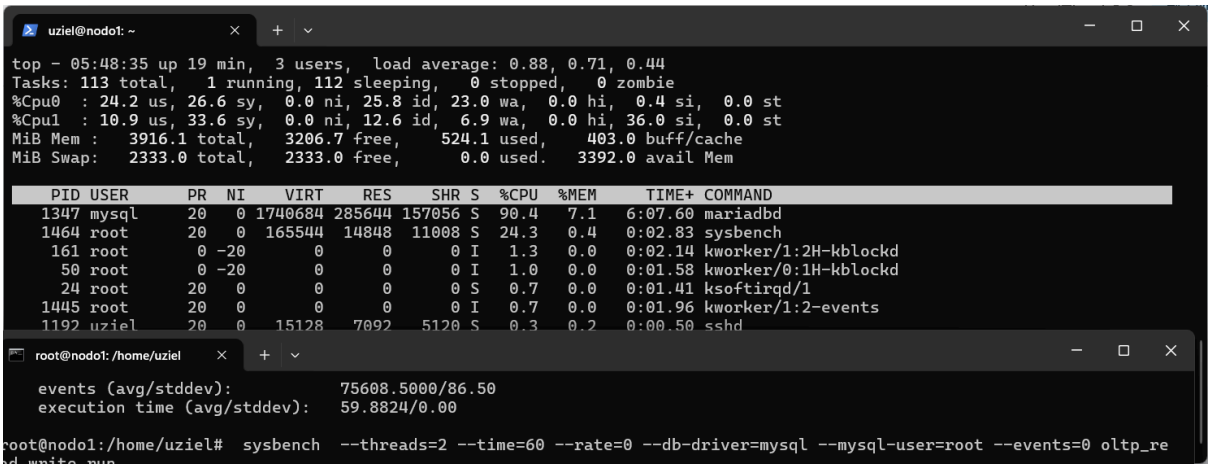


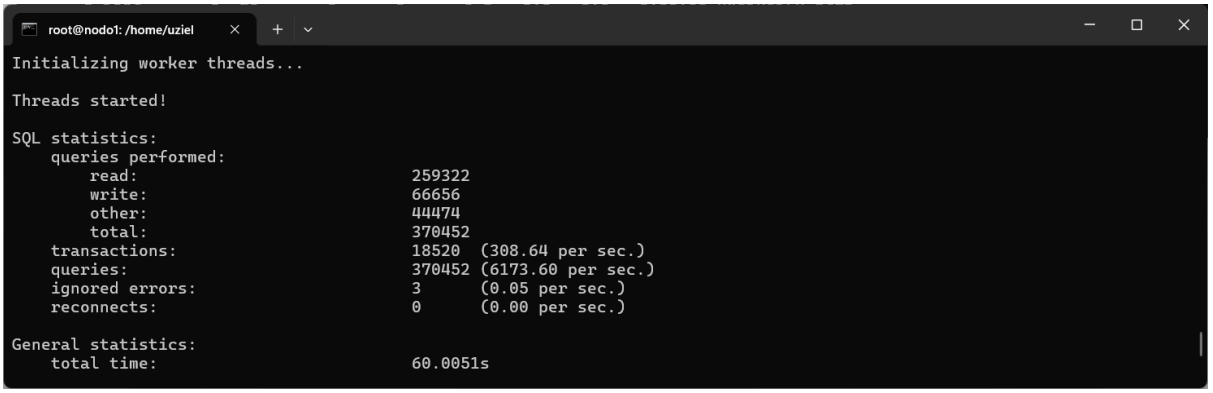
7.- sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_read_write run



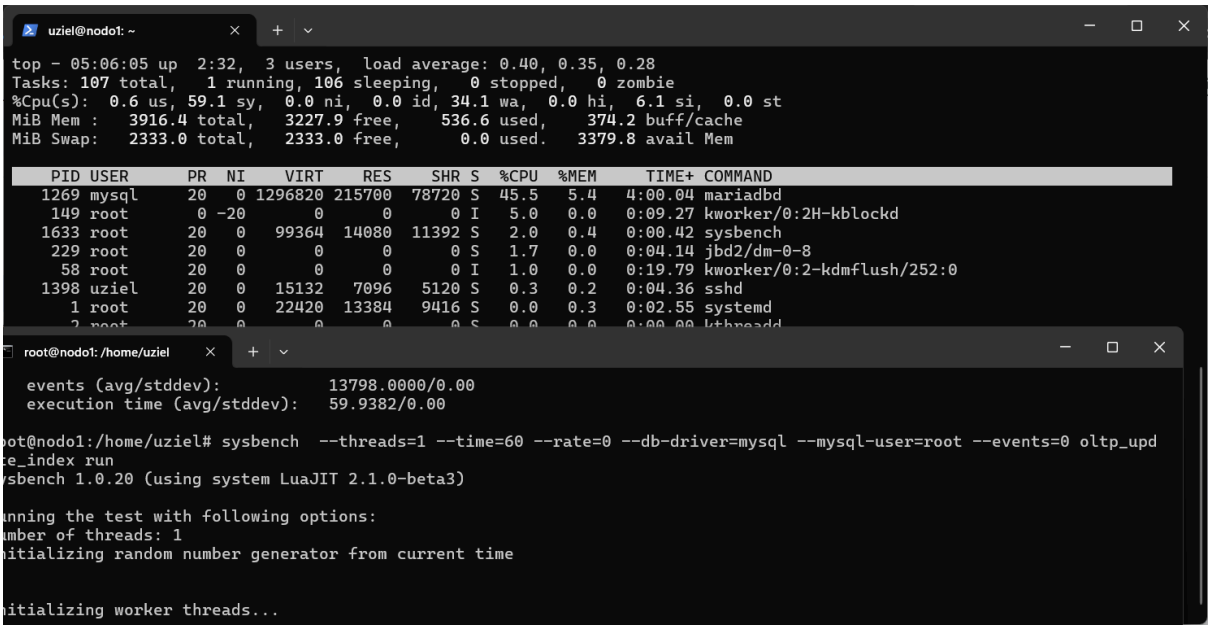


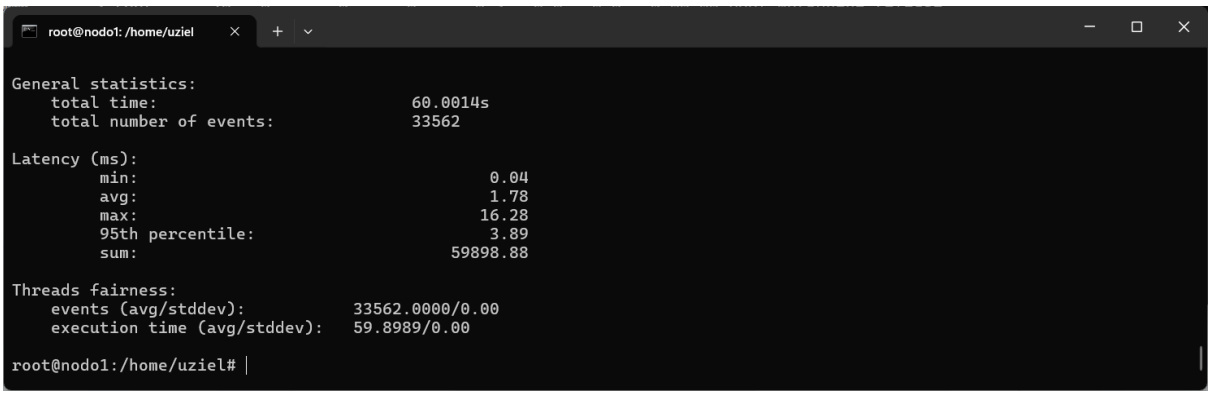
AHORA CON DOS CORES:



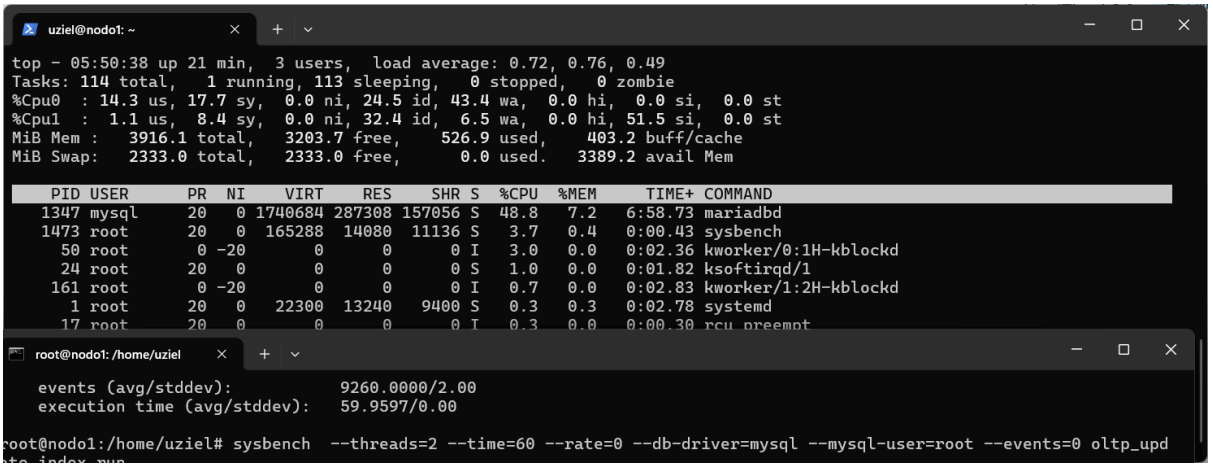


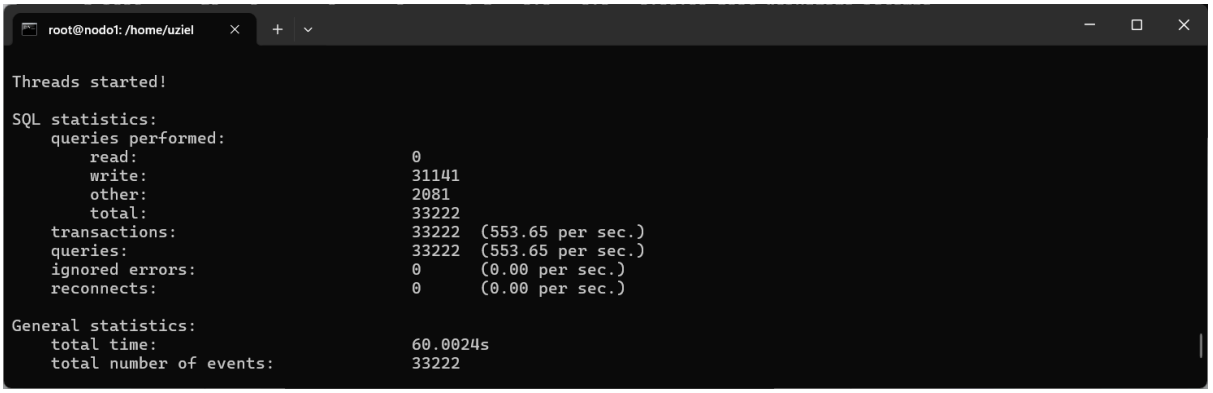
8.-sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_update_index run



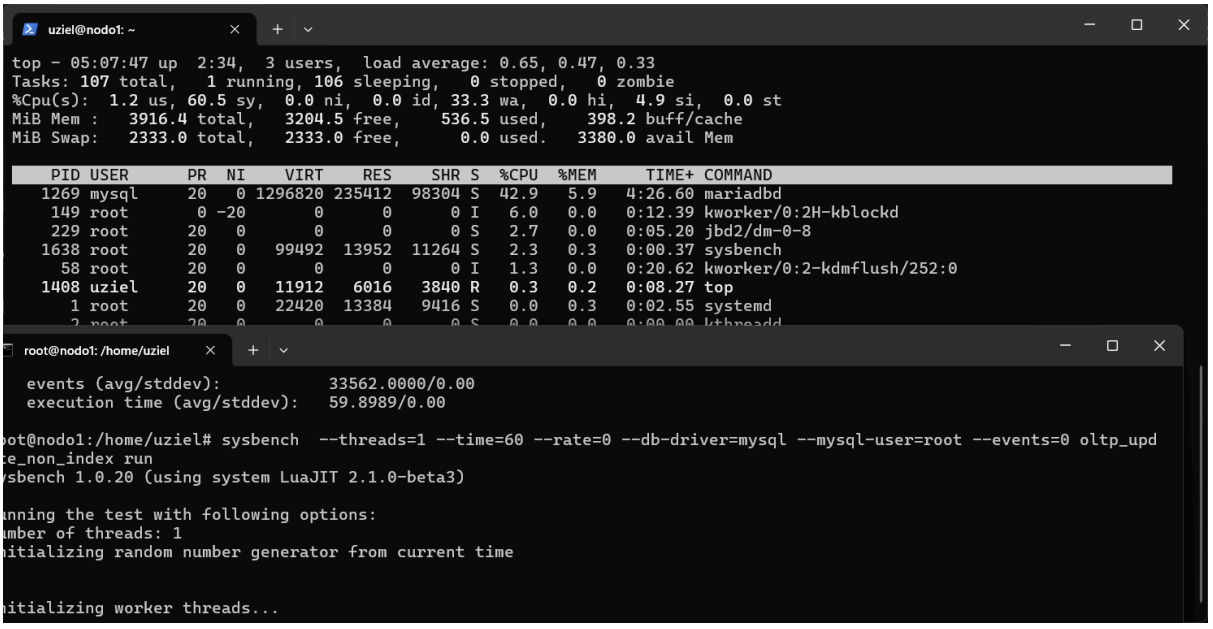


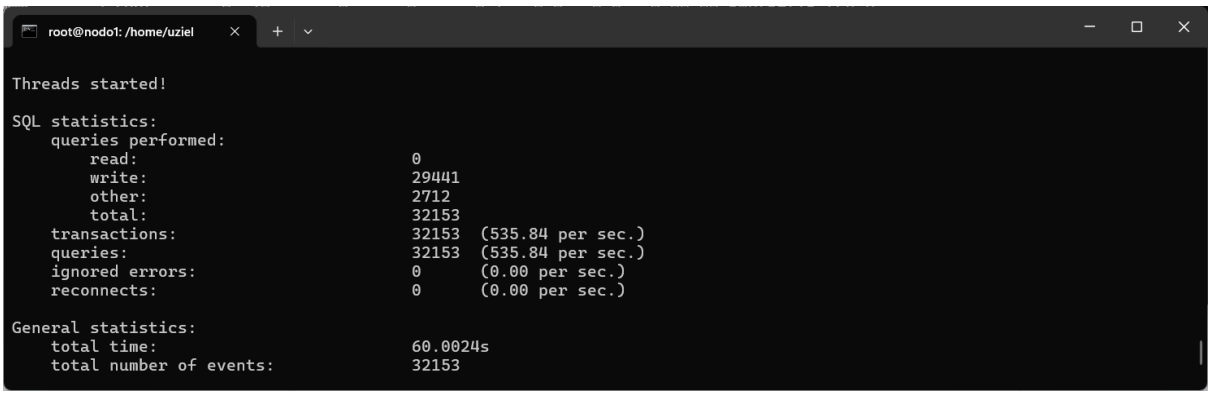
AHORA CON DOS CORES:



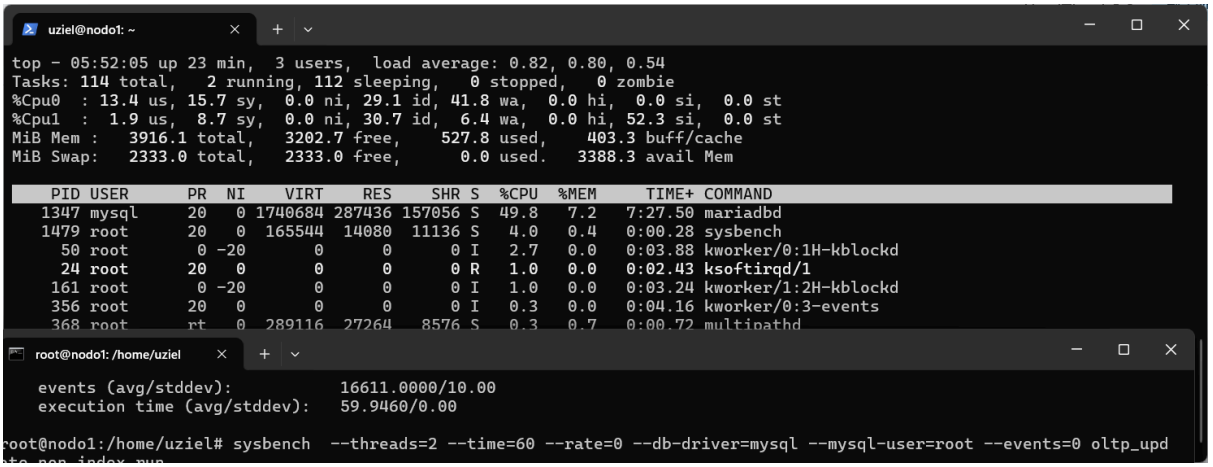


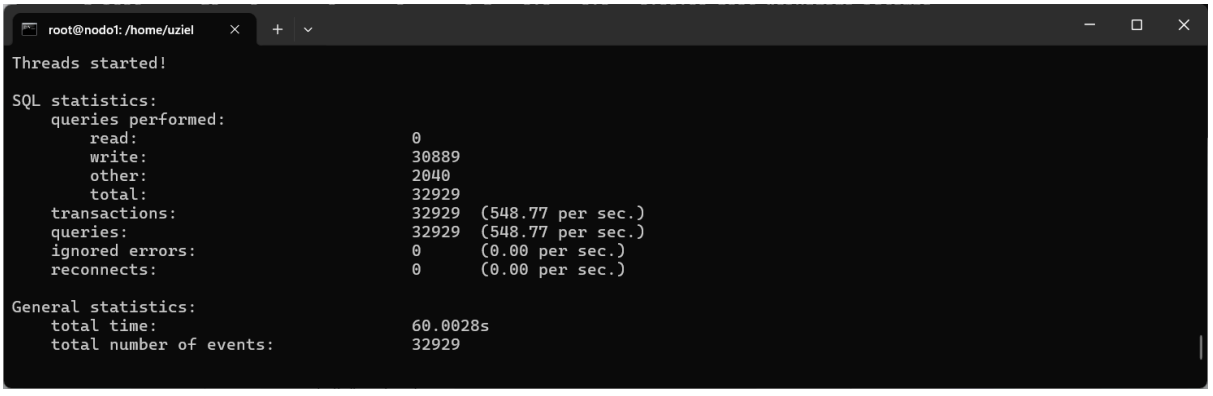
9.- sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_update_non_index run



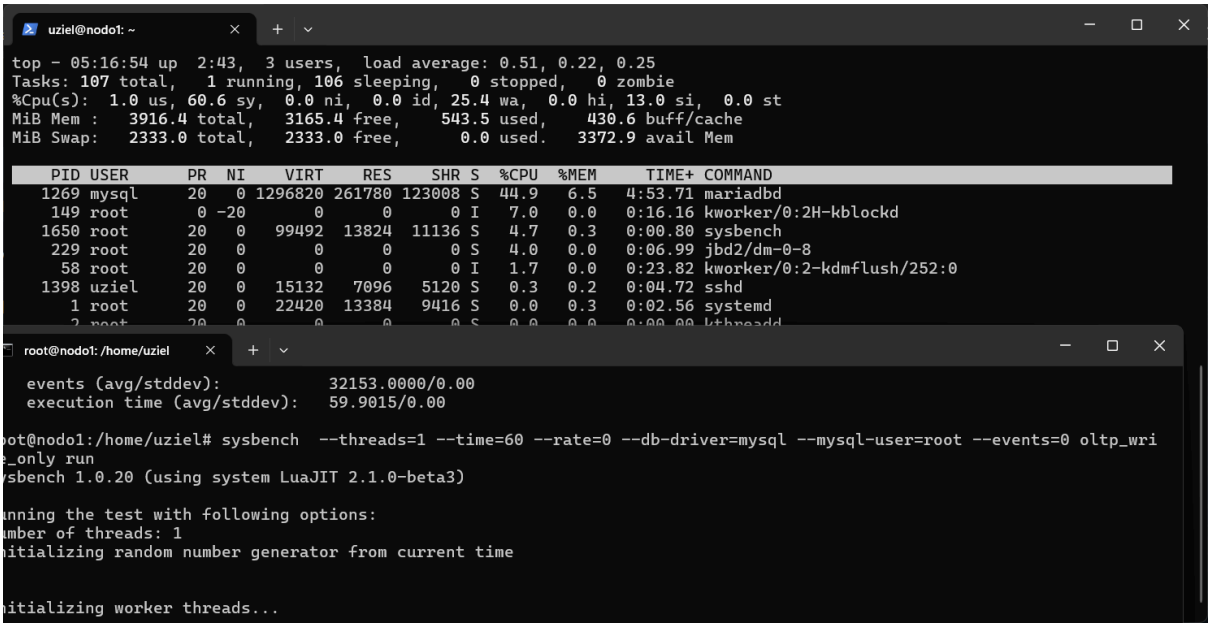


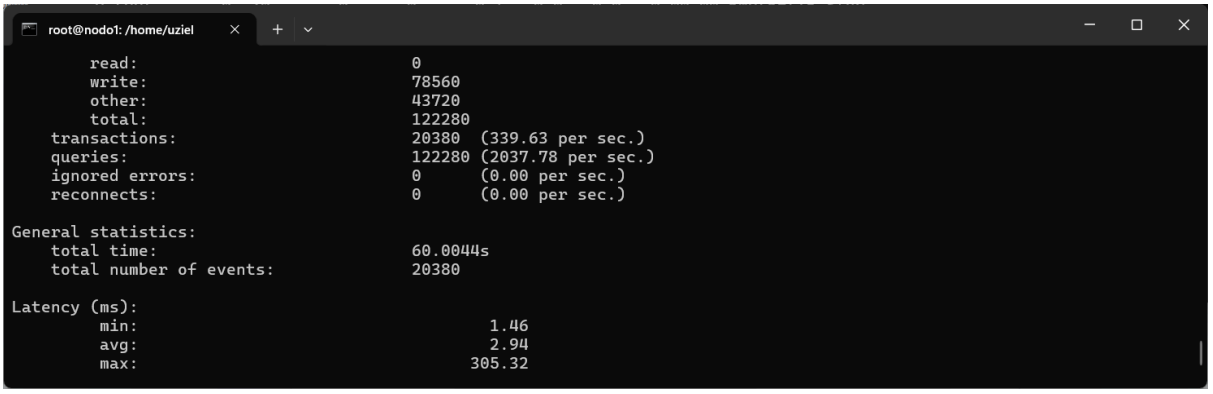
AHORA CON DOS CORES:



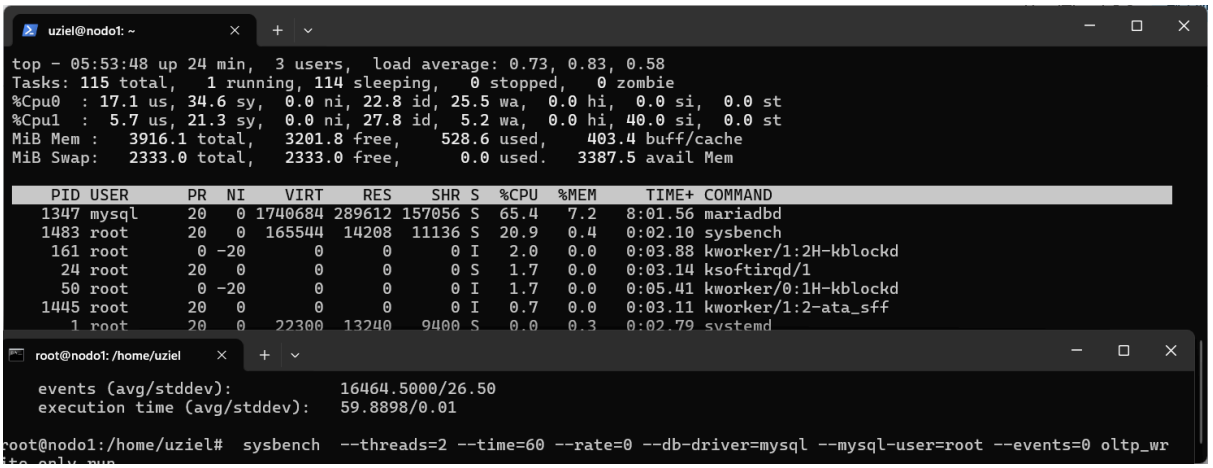


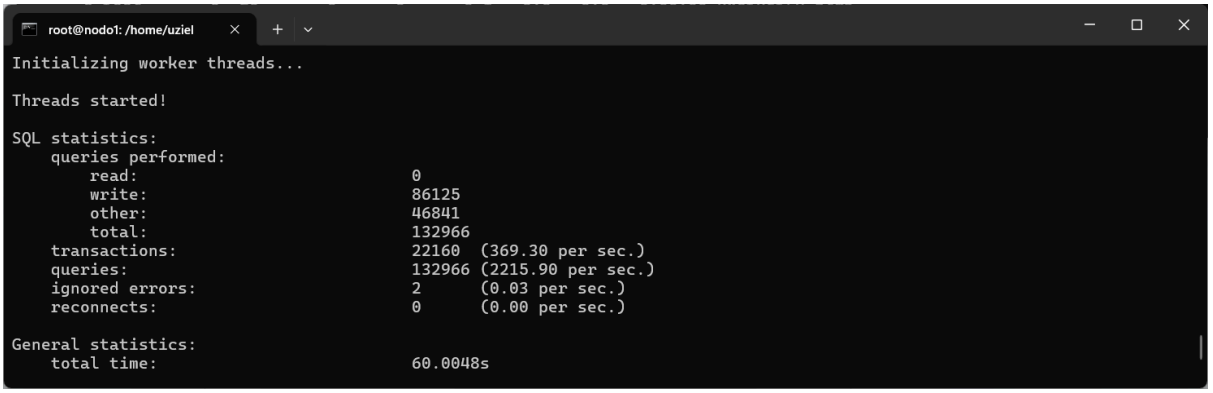
10.- sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_write_only run


uziel@nodo1: ~
top - 05:16:54 up 2:43, 3 users, load average: 0.51, 0.22, 0.25
Tasks: 107 total, 1 running, 106 sleeping, 0 stopped, 0 zombie
%Cpu(s): 1.0 us, 60.6 sy, 0.0 ni, 0.0 id, 25.4 wa, 0.0 hi, 13.0 si, 0.0 st
MiB Mem : 3916.4 total, 3165.4 free, 543.5 used, 430.6 buff/cache
MiB Swap: 2333.0 total, 2333.0 free, 0.0 used. 3372.9 avail Mem
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
1269 mysql 20 0 1296820 261780 123008 S 44.9 6.5 4:53.71 mariadbd
149 root 0 -20 0 0 0 I 7.0 0.0 0:16.16 kworker/0:2H-kblockd
1650 root 20 0 99492 13824 11136 S 4.7 0.3 0:00.80 sysbench
229 root 20 0 0 0 0 S 4.0 0.0 0:06.99 jbd2/dm-0-8
58 root 20 0 0 0 0 I 1.7 0.0 0:23.82 kworker/0:2-kdmflush/252:0
1398 uziel 20 0 15132 7096 5120 S 0.3 0.2 0:04.72 sshd
1 root 20 0 22420 13384 9416 S 0.0 0.3 0:02.56 systemd
root@nodo1: /home/uziel
events (avg/stddev): 32153.0000/0.00
execution time (avg/stddev): 59.9015/0.00
oot@nodo1:/home/uziel# sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_wri
e_only run
ysbench 1.0.20 (using system LuaJIT 2.1.0-beta3)
nning the test with following options:
mber of threads: 1
itializing random number generator from current time
itializing worker threads...

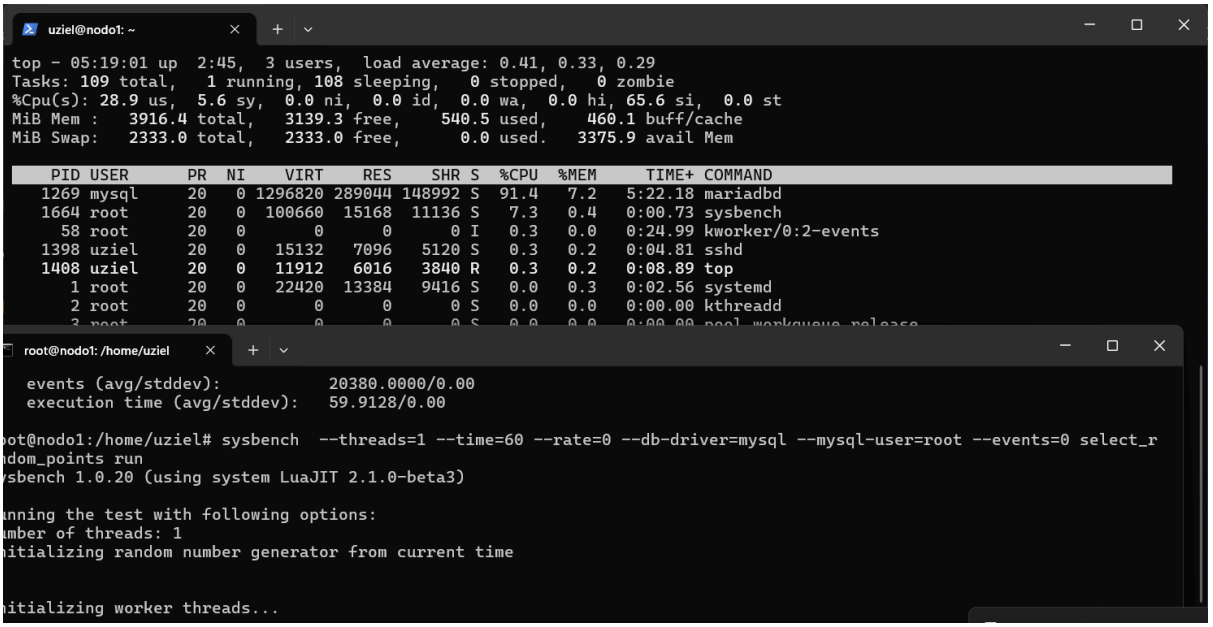

root@nodo1: /home/uziel
read: 0
write: 78560
other: 43720
total: 122280
transactions: 20380 (339.63 per sec.)
queries: 122280 (2037.78 per sec.)
ignored errors: 0 (0.00 per sec.)
reconnects: 0 (0.00 per sec.)
General statistics:
total time: 60.0044s
total number of events: 20380
Latency (ms):
min: 1.46
avg: 2.94
max: 305.32

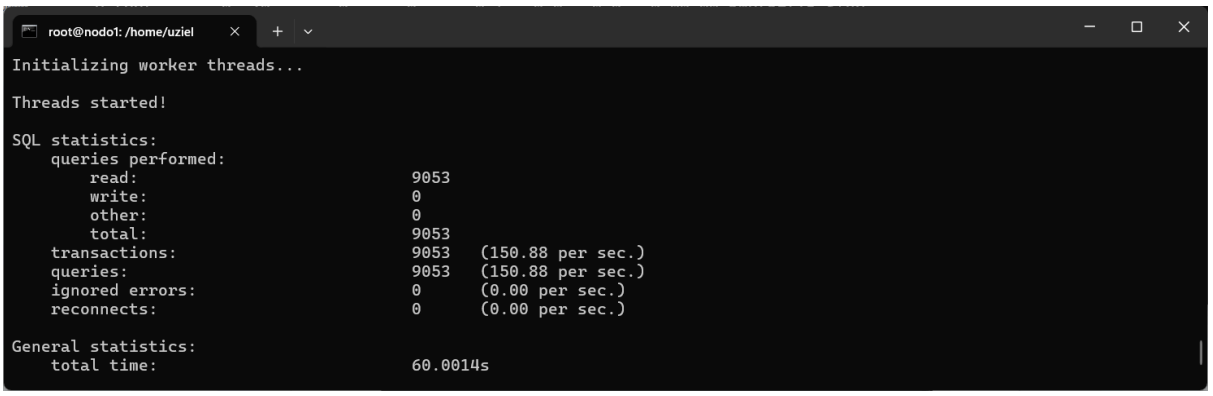
DOS CORES:


uziel@nodo1: ~
top - 05:53:48 up 24 min, 3 users, load average: 0.73, 0.83, 0.58
Tasks: 115 total, 1 running, 114 sleeping, 0 stopped, 0 zombie
%Cpu0 : 17.1 us, 34.6 sy, 0.0 ni, 22.8 id, 25.5 wa, 0.0 hi, 0.0 si, 0.0 st
%Cpu1 : 5.7 us, 21.3 sy, 0.0 ni, 27.8 id, 5.2 wa, 0.0 hi, 40.0 si, 0.0 st
MiB Mem : 3916.1 total, 3201.8 free, 528.6 used, 403.4 buff/cache
MiB Swap: 2333.0 total, 2333.0 free, 0.0 used. 3387.5 avail Mem
PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
1347 mysql 20 0 1740684 289612 157056 S 65.4 7.2 8:01.56 mariadbd
1483 root 20 0 165544 14208 11136 S 20.9 0.4 0:02.10 sysbench
161 root 0 -20 0 0 0 I 2.0 0.0 0:03.88 kworker/1:2H-kblockd
24 root 20 0 0 0 0 S 1.7 0.0 0:03.14 ksoftirqd/1
50 root 0 -20 0 0 0 I 1.7 0.0 0:05.41 kworker/0:1H-kblockd
1445 root 20 0 0 0 0 I 0.7 0.0 0:03.11 kworker/1:2-ata_sff
1 root 20 0 22300 13240 9400 S 0.0 0.3 0:02.79 systemd
root@nodo1: /home/uziel
events (avg/stddev): 16464.5000/26.50
execution time (avg/stddev): 59.8898/0.01
root@nodo1:/home/uziel# sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 oltp_wr

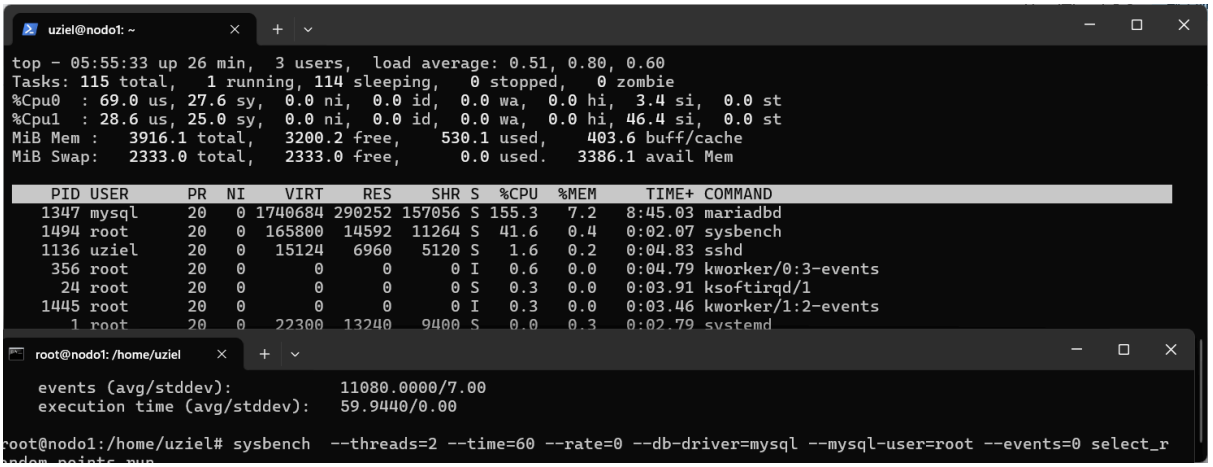


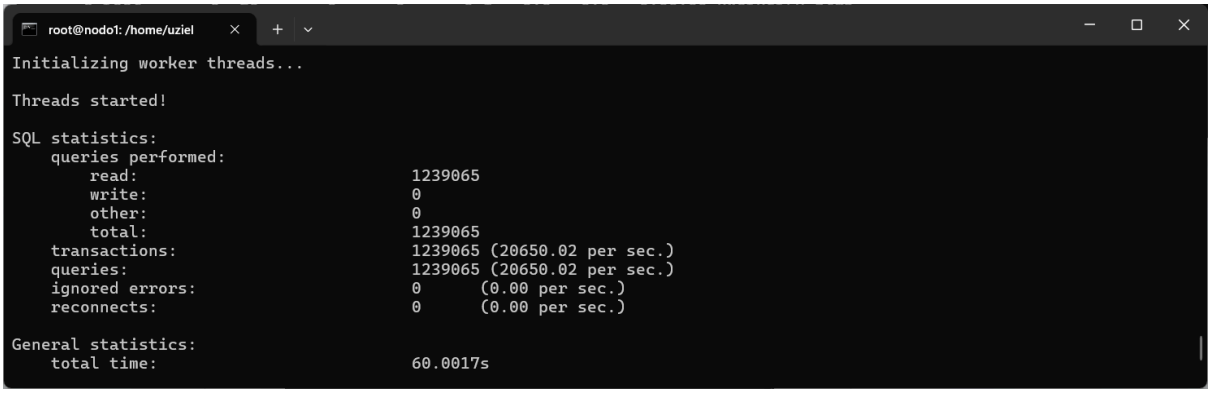
11.-sysbench --threads=1 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_random_points run



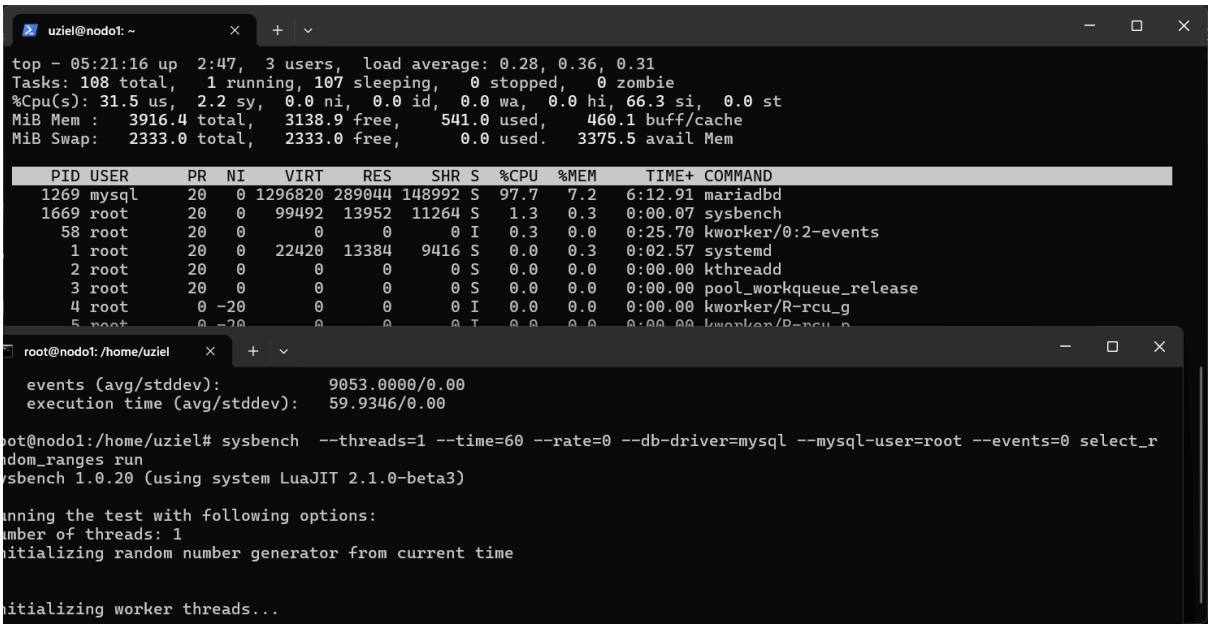


DOS CORES:





12.-sysbench --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_random_ranges run



```
root@nodo1: /home/uziel
Initializing worker threads...

Threads started!

SQL statistics:
    queries performed:
        read:                            12885
        write:                           0
        other:                           0
        total:                           12885
    transactions:                        12885  (214.73 per sec.)
    queries:                             12885  (214.73 per sec.)
    ignored errors:                      0      (0.00 per sec.)
    reconnects:                          0      (0.00 per sec.)

General statistics:
    total time:                          60.0057s
```

AHORA DOS CORES:

```
uziel@nodo1: ~
top - 05:57:43 up 28 min,  3 users,  load average: 0.58, 0.83, 0.64
Tasks: 114 total,   1 running, 113 sleeping,   0 stopped,   0 zombie
%Cpu0  : 77.1 us, 22.9 sy,  0.0 ni,  0.0 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
%Cpu1  : 66.7 us, 27.3 sy,  0.0 ni,  0.0 id,  0.0 wa,  0.0 hi,  6.1 si,  0.0 st
MiB Mem :   3916.1 total,   3200.2 free,    530.0 used,    403.6 buff/cache
MiB Swap:   2333.0 total,   2333.0 free,      0.0 used.   3386.1 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
   1347 mysql     20   0 1740684 290380 157056 S 158.1   7.2  10:20.26 mariadbd
   1497 root      20   0  165800  14592  11264 S  41.2   0.4   0:02.31 sysbench
   1445 root      20   0       0      0      0 I   0.7   0.0   0:03.79 kworker/1:2-events
      1 root      20   0   22300  13240   9400 S   0.0   0.3   0:02.79 systemd
      2 root      20   0       0      0      0 S   0.0   0.0   0:00.02 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
```

```
root@nodo1: /home/uziel
   events (avg/stddev):           619532.5000/6460.50
   execution time (avg/stddev):   59.5009/0.01

root@nodo1:/home/uziel# sysbench  --threads=2 --time=60 --rate=0 --db-driver=mysql --mysql-user=root --events=0 select_r
andom_ranges run
```

```
root@nodo1: /home/uziel

Threads started!

SQL statistics:
    queries performed:
        read:                            1244041
        write:                           0
        other:                           0
        total:                           1244041
    transactions:                        1244041 (20732.25 per sec.)
    queries:                             1244041 (20732.25 per sec.)
    ignored errors:                      0      (0.00 per sec.)
    reconnects:                          0      (0.00 per sec.)

General statistics:
    total time:                          60.0015s
    total number of events:              1244041
```

CONCLUSIÓN

Un **servidor** es una computadora especializada que responde a solicitudes de otros dispositivos en una red, brindando servicios como bases de datos, almacenamiento o procesamiento de aplicaciones. Su rendimiento depende de varios factores, como la capacidad de la CPU, la memoria RAM, la velocidad del disco y la optimización del sistema operativo.

Uno de los aspectos clave en el desempeño de un servidor es la **cantidad de núcleos (cores) del procesador**.

Diferencia entre usar 1 núcleo vs. 2 núcleos

1. **Con un solo núcleo (1 core)**
    - Todas las tareas deben ejecutarse secuencialmente, lo que puede generar **cuellos de botella** en procesos intensivos.
    - Si hay múltiples aplicaciones ejecutándose (como una base de datos y un servidor web), deben compartir el mismo núcleo, lo que puede causar **latencia y ralentización**.
    - Es menos eficiente para manejar múltiples conexiones simultáneas.
2. **Con dos núcleos (2 cores)**
    - Se pueden ejecutar procesos en paralelo, permitiendo una mejor distribución de carga.
    - Mejora significativamente el rendimiento en tareas multi-hilo, como el manejo de bases de datos o servidores web con múltiples usuarios.
    - Reduce el **tiempo de respuesta**, ya que el sistema puede asignar diferentes tareas a distintos núcleos, evitando bloqueos.

En conclusión, **tener más núcleos mejora el rendimiento y la capacidad de respuesta del servidor**, especialmente en entornos donde hay múltiples tareas en ejecución. Para cargas ligeras, un solo núcleo puede ser suficiente, pero para bases de datos, virtualización o servidores web con muchas conexiones, **más núcleos significan mayor eficiencia y estabilidad**.