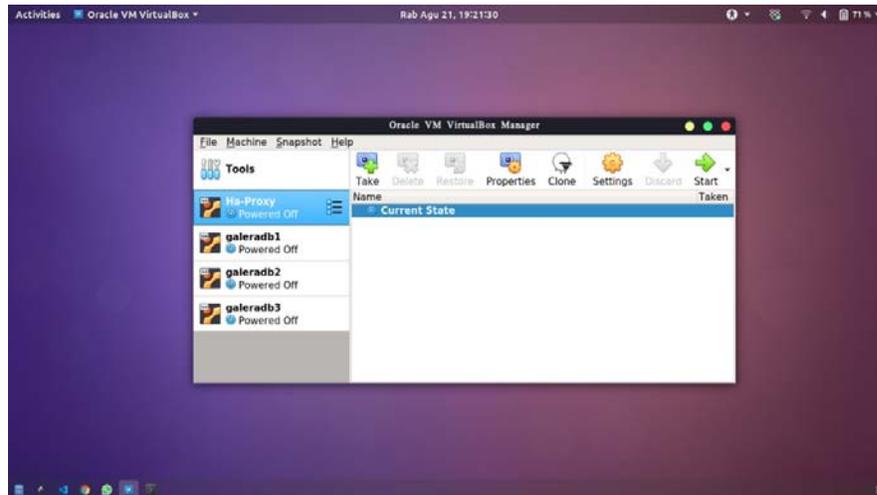


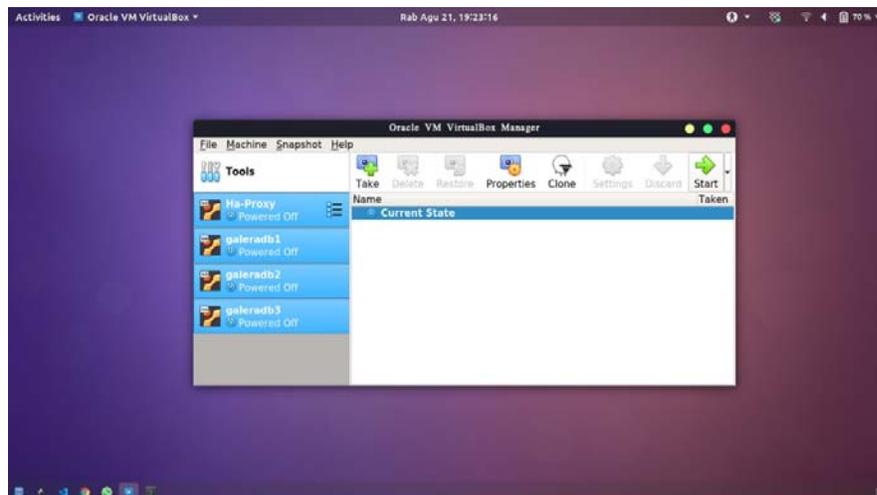
CARA MENJALANKAN PROGRAM

Penelitian ini menggunakan *VirtualBox* sebagai simulator untuk menjalankan sistem operasi yang berisi *database server* maupun *load balancer*. Berikut ini adalah cara untuk menjalankan program.

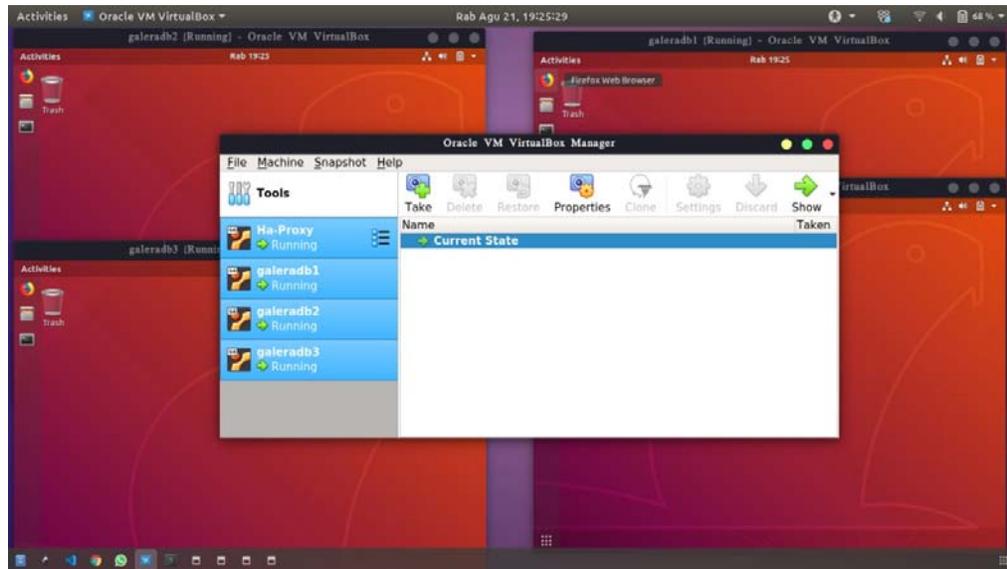
1. Buka VirtualBox



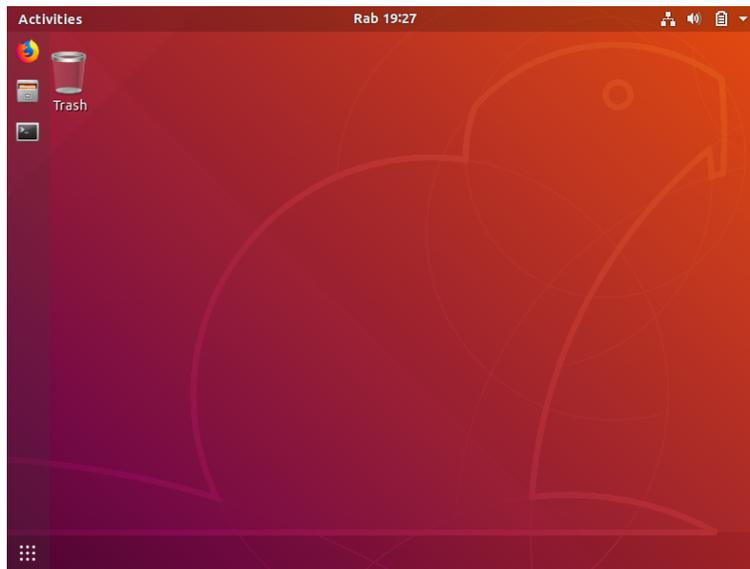
2. Jalankan semua *server* yang ada di *VirtualBox* diantaranya *server* Haproxy, galeradb1, galeradb2, dan juga galeradb3.



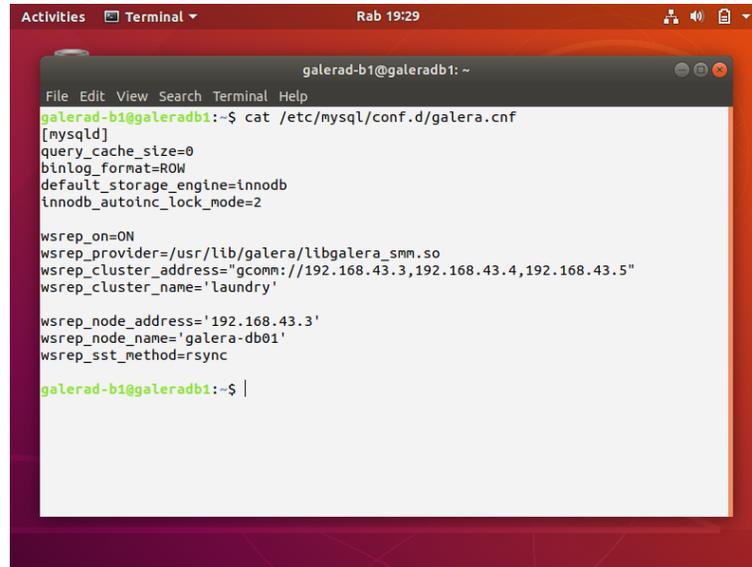
3. Berikut adalah keadaan dimana semua *server* sudah berjalan



4. Setelah semua berjalan, masuk ke *server* galeradb1
 - a. Tampilan awal *server* galeradb1

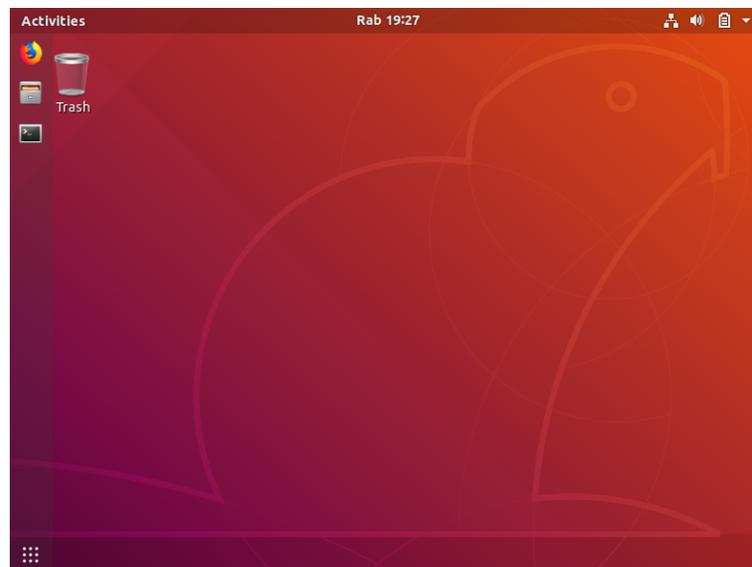


- b. Konfigurasi galera pada *server* galeradb1. File konfigurasi terletak di direktori `/etc/mysql/conf.d/galera.cnf` dengan isi sebagai berikut :

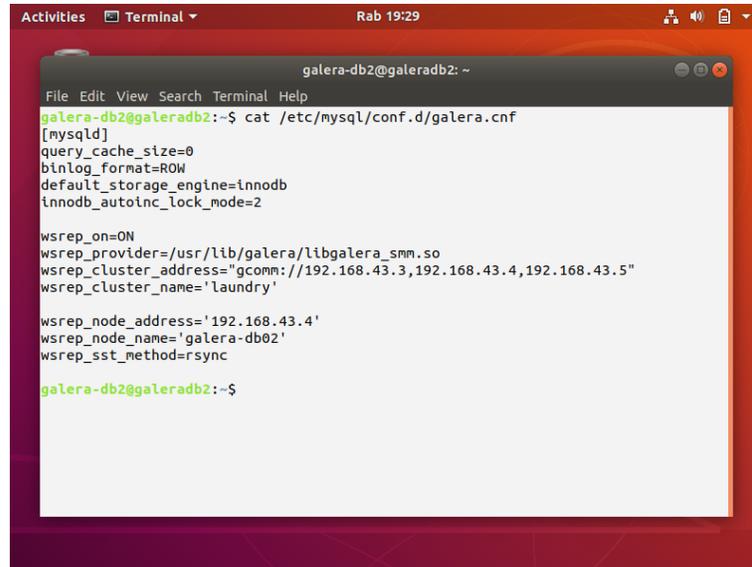


```
galerad-b1@galeradb1: ~  
File Edit View Search Terminal Help  
galerad-b1@galeradb1:~$ cat /etc/mysql/conf.d/galera.cnf  
[mysqld]  
query_cache_size=0  
binlog_format=ROW  
default_storage_engine=innodb  
innodb_autoinc_lock_mode=2  
  
wsrep_on=ON  
wsrep_provider=/usr/lib/galera/libgalera_smm.so  
wsrep_cluster_address="gcomm://192.168.43.3,192.168.43.4,192.168.43.5"  
wsrep_cluster_name='laundry'  
  
wsrep_node_address='192.168.43.3'  
wsrep_node_name='galera-db01'  
wsrep_sst_method=rsync  
galerad-b1@galeradb1:~$ |
```

5. Setelah semua berjalan, masuk ke *server* galeradb1
- a. Tampilan awal *server* galeradb2

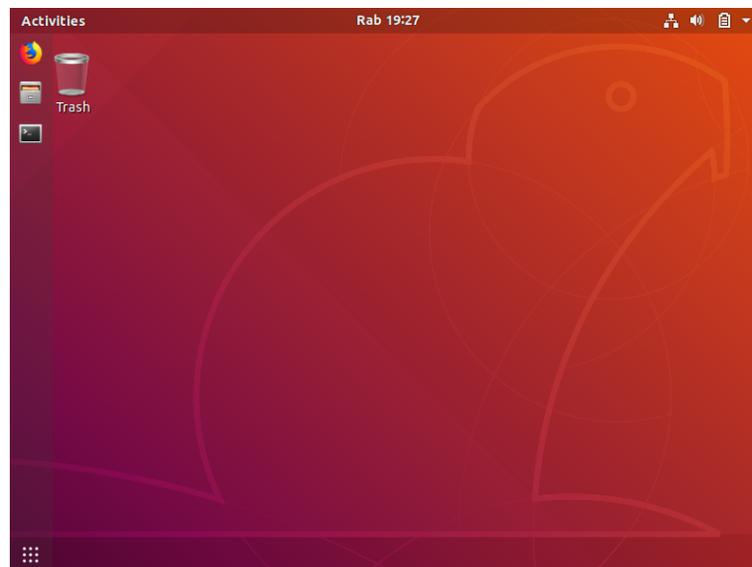


- b. Konfigurasi galera pada server galeradb1. File konfigurasi terletak di direktori `/etc/mysql/conf.d/galera.cnf` dengan isi sebagai berikut :

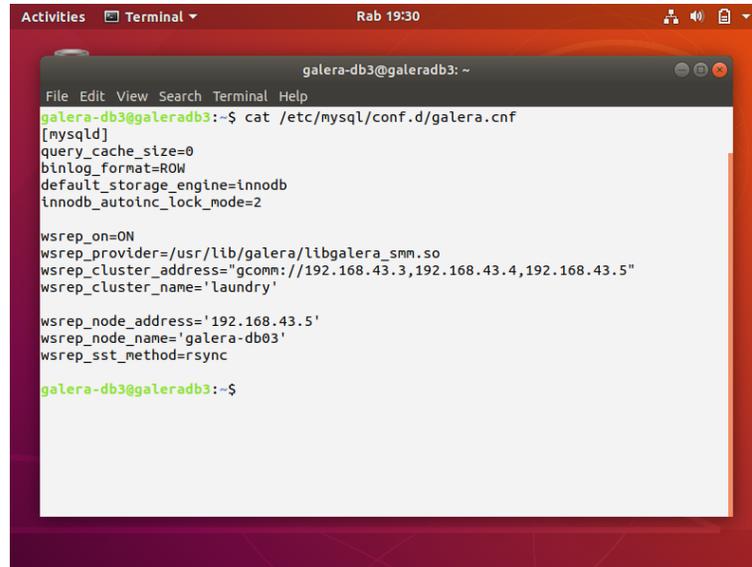


```
galera-db2@galeradb2: ~  
File Edit View Search Terminal Help  
galera-db2@galeradb2:~$ cat /etc/mysql/conf.d/galera.cnf  
[mysqld]  
query_cache_size=0  
binlog_format=ROW  
default_storage_engine=innodb  
innodb_autoinc_lock_mode=2  
  
wsrep_on=ON  
wsrep_provider=/usr/lib/galera/libgalera_smm.so  
wsrep_cluster_address="gcomm://192.168.43.3,192.168.43.4,192.168.43.5"  
wsrep_cluster_name='laundry'  
  
wsrep_node_address='192.168.43.4'  
wsrep_node_name='galera-db02'  
wsrep_sst_method=rsync  
galera-db2@galeradb2:~$
```

6. Setelah semua berjalan, masuk ke *server* galeradb1
- a. Tampilan awal *server* galeradb3



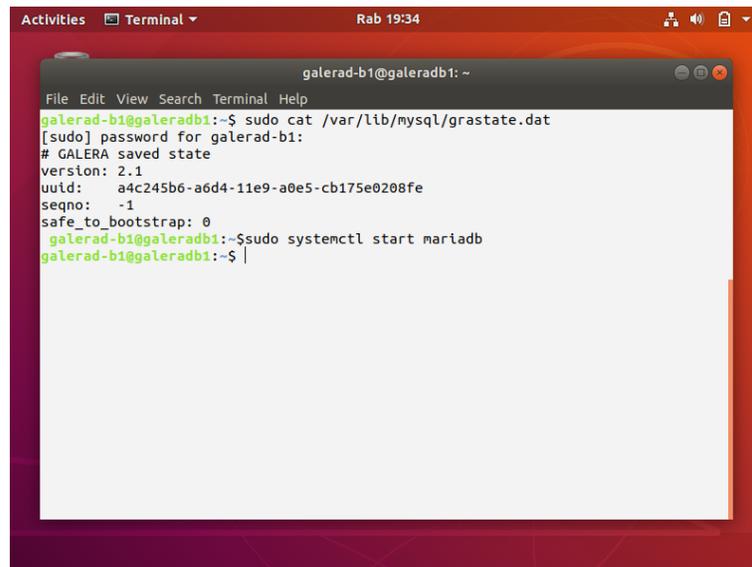
- b. Konfigurasi galera pada *server* galeradb1. File konfigurasi terletak di direktori `/etc/mysql/conf.d/galera.cnf` dengan isi sebagai berikut :



```
galera-db3@galeradb3: ~  
File Edit View Search Terminal Help  
galera-db3@galeradb3:~$ cat /etc/mysql/conf.d/galera.cnf  
[mysqld]  
query_cache_size=0  
binlog_format=ROW  
default_storage_engine=innodb  
innodb_autoinc_lock_mode=2  
  
wsrep_on=ON  
wsrep_provider=/usr/lib/galera/libgalera_smm.so  
wsrep_cluster_address="gcomm://192.168.43.3,192.168.43.4,192.168.43.5"  
wsrep_cluster_name='laundry'  
  
wsrep_node_address='192.168.43.5'  
wsrep_node_name='galera-db03'  
wsrep_sst_method=rsync  
galera-db3@galeradb3:~$
```

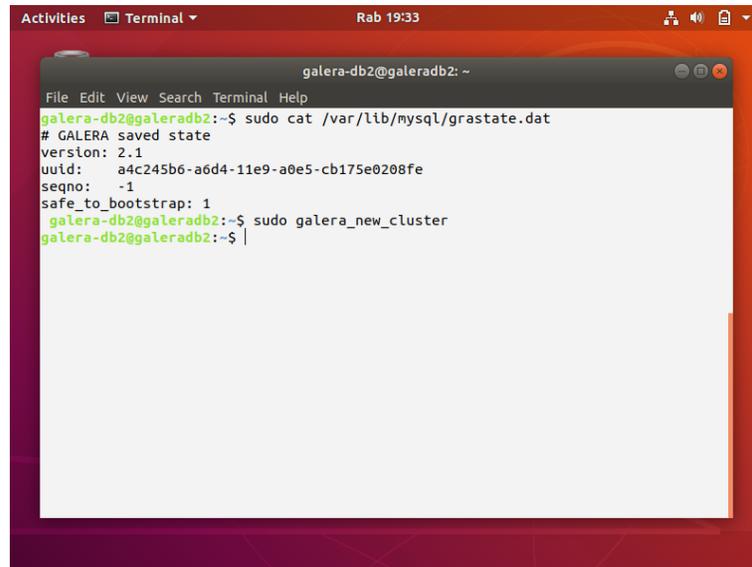
7. Setelah konfigurasi selesai dilakukan, Jalankan galera cluster pada masing masing *server*.

- a. *Server* galeradb1



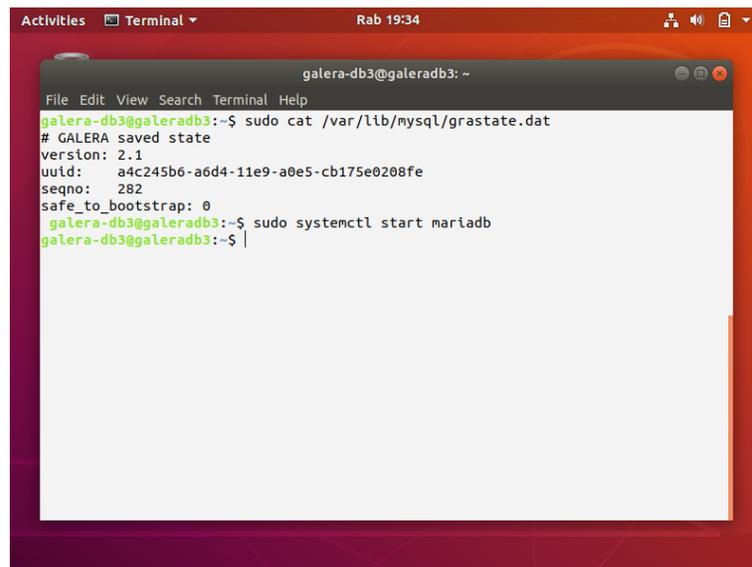
```
galerad-b1@galeradb1: ~  
File Edit View Search Terminal Help  
galerad-b1@galeradb1:~$ sudo cat /var/lib/mysql/grastate.dat  
[sudo] password for galerad-b1:  
# GALERA saved state  
version: 2.1  
uuid: a4c245b6-a6d4-11e9-a0e5-cb175e0208fe  
seqno: -1  
safe_to_bootstrap: 0  
galerad-b1@galeradb1:~$ sudo systemctl start mariadb  
galerad-b1@galeradb1:~$ |
```

b. *Server galera db2*



```
galera-db2@galeradb2: ~  
File Edit View Search Terminal Help  
galera-db2@galeradb2:~$ sudo cat /var/lib/mysql/grastate.dat  
# GALERA saved state  
version: 2.1  
uuid: a4c245b6-a6d4-11e9-a0e5-cb175e0208fe  
seqno: -1  
safe_to_bootstrap: 1  
galera-db2@galeradb2:~$ sudo galera_new_cluster  
galera-db2@galeradb2:~$ |
```

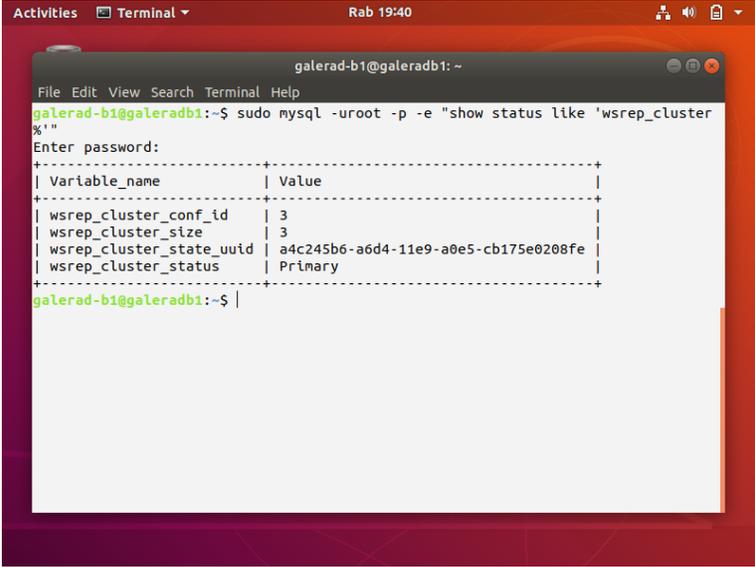
c. *Server galera db3*



```
galera-db3@galeradb3: ~  
File Edit View Search Terminal Help  
galera-db3@galeradb3:~$ sudo cat /var/lib/mysql/grastate.dat  
# GALERA saved state  
version: 2.1  
uuid: a4c245b6-a6d4-11e9-a0e5-cb175e0208fe  
seqno: 282  
safe_to_bootstrap: 0  
galera-db3@galeradb3:~$ sudo systemctl start mariadb  
galera-db3@galeradb3:~$ |
```

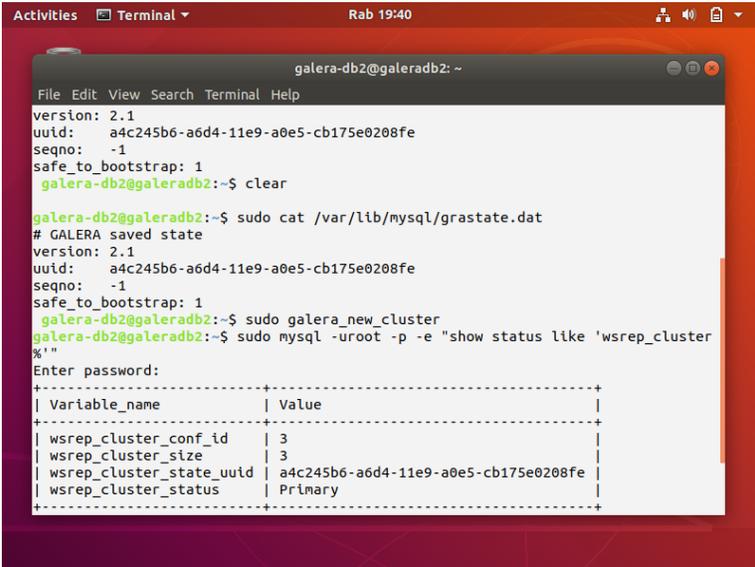
8. Periksa apakah galera cluster sudah berjalan dengan benar atau belum

a. *Server galera db1*



```
galerad-b1@galeradb1:~$ sudo mysql -uroot -p -e "show status like 'wsrep_cluster%'"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_conf_id | 3 |
| wsrep_cluster_size | 3 |
| wsrep_cluster_state_uuid | a4c245b6-a6d4-11e9-a0e5-cb175e0208fe |
| wsrep_cluster_status | Primary |
+-----+-----+
```

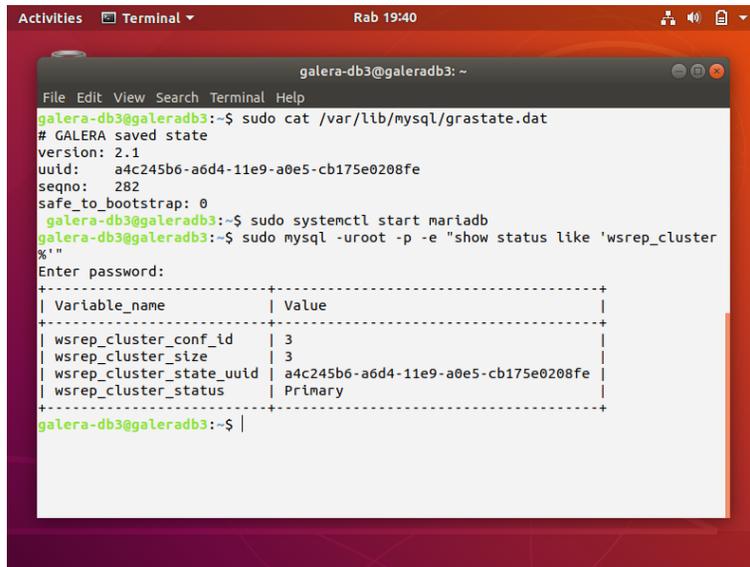
b. *Server galera db2*



```
galera-db2@galeradb2:~$ sudo cat /var/lib/mysql/grastate.dat
# GALERA saved state
version: 2.1
uuid: a4c245b6-a6d4-11e9-a0e5-cb175e0208fe
seqno: -1
safe_to_bootstrap: 1
galera-db2@galeradb2:~$ clear

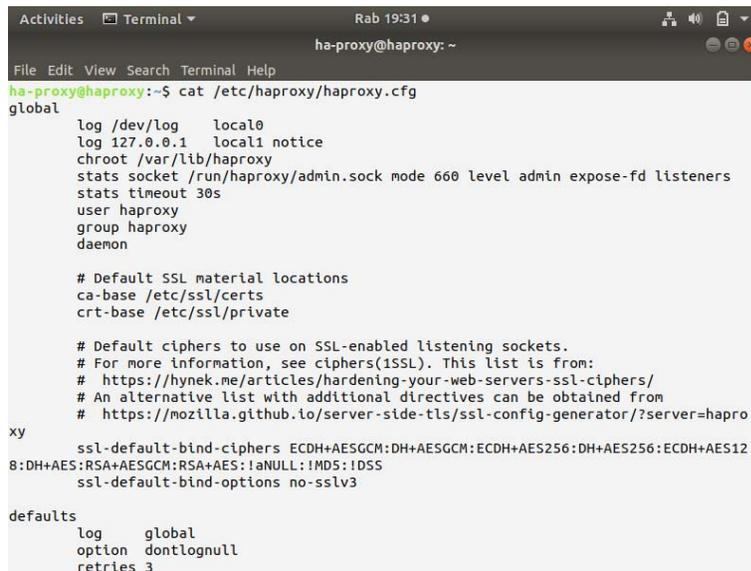
galera-db2@galeradb2:~$ sudo galera_new_cluster
galera-db2@galeradb2:~$ sudo mysql -uroot -p -e "show status like 'wsrep_cluster%'"
Enter password:
+-----+-----+
| Variable_name | Value |
+-----+-----+
| wsrep_cluster_conf_id | 3 |
| wsrep_cluster_size | 3 |
| wsrep_cluster_state_uuid | a4c245b6-a6d4-11e9-a0e5-cb175e0208fe |
| wsrep_cluster_status | Primary |
+-----+-----+
```

c. *Server galera-db3*



```
galera-db3@galeradb3:~  
File Edit View Search Terminal Help  
galera-db3@galeradb3:~$ sudo cat /var/lib/mysql/grastate.dat  
# GALERA saved state  
version: 2.1  
uuid: a4c245b6-a6d4-11e9-a0e5-cb175e0208fe  
seqno: 282  
safe_to_bootstrap: 0  
galera-db3@galeradb3:~$ sudo systemctl start mariadb  
galera-db3@galeradb3:~$ sudo mysql -uroot -p -e "show status like 'wsrep_cluster%'"  
Enter password:  
+-----+  
| Variable_name | Value |  
+-----+  
| wsrep_cluster_conf_id | 3 |  
| wsrep_cluster_size | 3 |  
| wsrep_cluster_state_uuid | a4c245b6-a6d4-11e9-a0e5-cb175e0208fe |  
| wsrep_cluster_status | Primary |  
+-----+  
galera-db3@galeradb3:~$ |
```

9. Setelah selesai melakukan konfigurasi di *database server*, selanjutnya lakukan konfigurasi pada *haproxy* yang digunakan sebagai *load balancer*.



```
ha-proxy@haproxy:~  
File Edit View Search Terminal Help  
ha-proxy@haproxy:~$ cat /etc/haproxy/haproxy.cfg  
global  
    log /dev/log      local0  
    log 127.0.0.1    local1 notice  
    chroot /var/lib/haproxy  
    stats socket /run/haproxy/admin.sock mode 660 level admin expose-fd listeners  
    stats timeout 30s  
    user haproxy  
    group haproxy  
    daemon  
  
    # Default SSL material locations  
    ca-base /etc/ssl/certs  
    crt-base /etc/ssl/private  
  
    # Default ciphers to use on SSL-enabled listening sockets.  
    # For more information, see ciphers(1SSL). This list is from:  
    # https://hynek.me/articles/hardening-your-web-servers-ssl-ciphers/  
    # An alternative list with additional directives can be obtained from  
    # https://mozilla.github.io/server-side-tls/ssl-config-generator/?server=haproxy  
xy  
    ssl-default-bind-ciphers ECDH+AESGCM:DH+AESGCM:ECDH+AES256:DH+AES256:ECDH+AES128:DH+AES:RSA+AESGCM:RSA+AES:!aNULL:!MD5:!DSS  
    ssl-default-bind-options no-sslv3  
  
defaults  
    log          global  
    option      dontlognull  
    retries     3
```

```
Activities Terminal Rab 19:31
ha-proxy@ha-proxy: ~
File Edit View Search Terminal Help
timeout client 50000
timeout server 50000
errorfile 400 /etc/haproxy/errors/400.http
errorfile 403 /etc/haproxy/errors/403.http
errorfile 408 /etc/haproxy/errors/408.http
errorfile 500 /etc/haproxy/errors/500.http
errorfile 502 /etc/haproxy/errors/502.http
errorfile 503 /etc/haproxy/errors/503.http
errorfile 504 /etc/haproxy/errors/504.http

listen cluster_laundry
bind 0.0.0.0:3306
mode tcp
option mysql-check user haproxy_check
balance leastconn
server galera-db01 192.168.43.3:3306 check
server galera-db02 192.168.43.4:3306 check
server galera-db03 192.168.43.5:3306 check

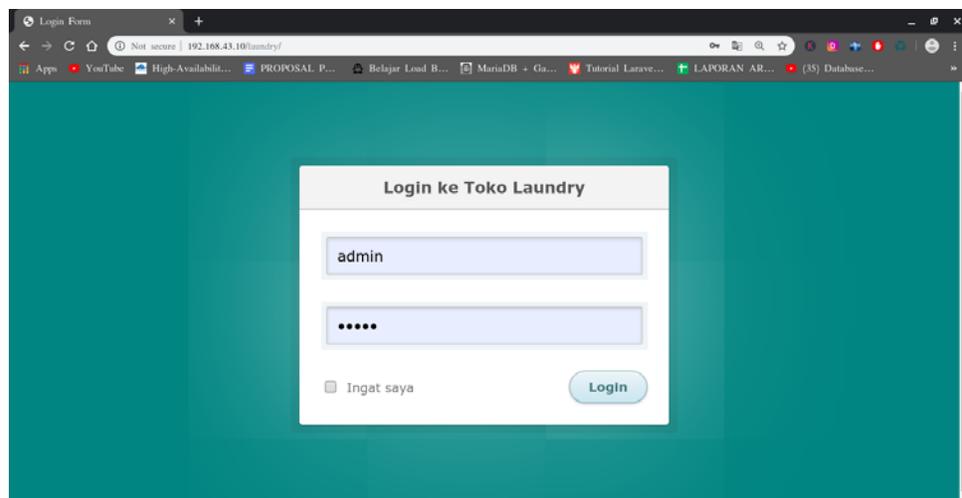
listen statistik
bind 192.168.43.10:8080
mode http
option httpclose
stats enable
stats uri /
stats realm Haproxy Statistics
stats auth sarwan:sarwan
ha-proxy@ha-proxy:~$
```

10. Kemudian jalankan *haproxy load balancer*

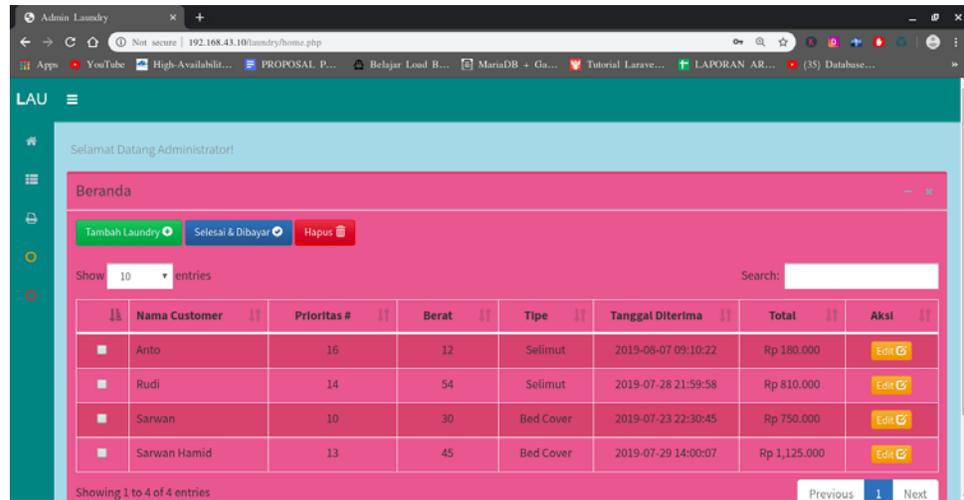
```
Activities Terminal Rab 20:02
ha-proxy@ha-proxy: ~
File Edit View Search Terminal Help
ha-proxy@ha-proxy:~$ sudo systemctl start haproxy
[sudo] password for ha-proxy:
ha-proxy@ha-proxy:~$
```

11. Setelah *Haproxy* berjalan, kemudian akses Aplikasi Transaksi Central Laundry yang diakses melalui *web browser*.

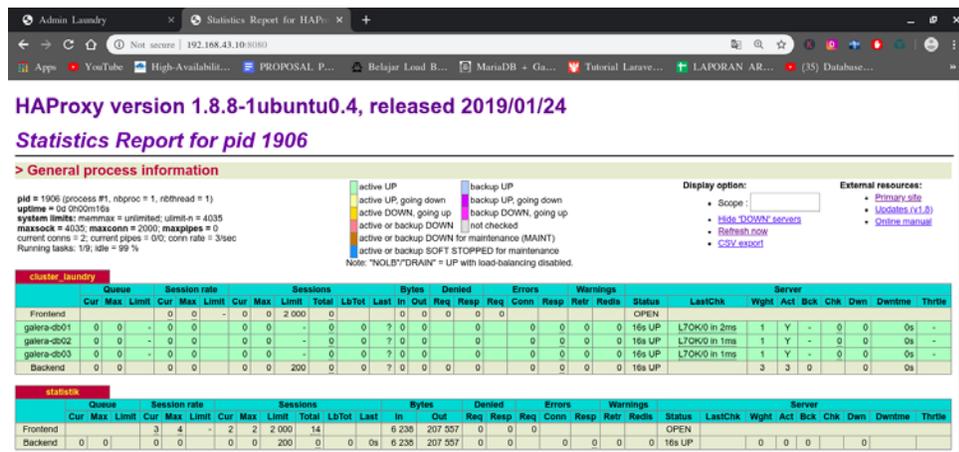
a. Login aplikasi, login dengan user **admin** dan password **admin**.



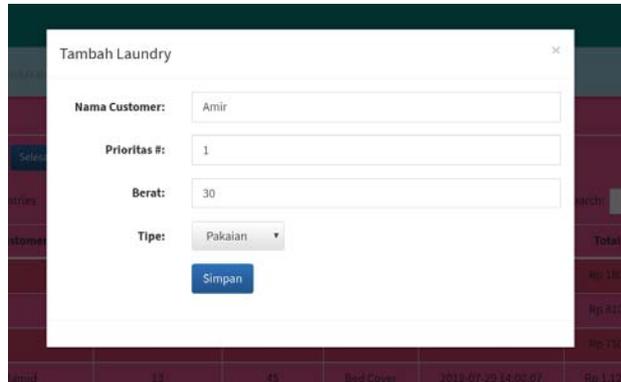
b. Tampilan awal Aplikasi Transaksi Central Laundry Berbasis Web



12. Buka statistik dari *haproxy loadbalancer* yang sebelumnya sudah dibuat. Ketikkan alamat **192.168.43.10:8080**



13. Kembali lagi ke Aplikasi Transaksi Central Laundry untuk melakukan inputan data.



Tambah Laundry

Nama Customer: Amir

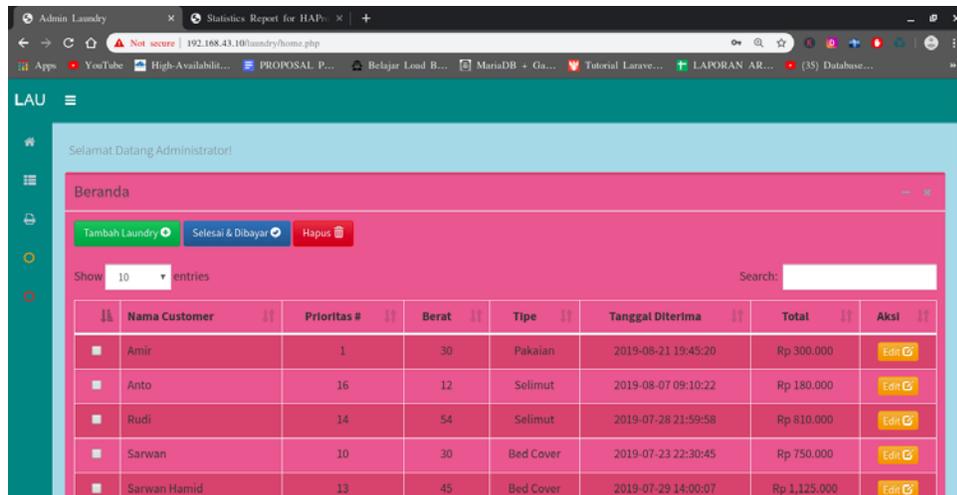
Prioritas #: 1

Berat: 30

Tipe: Pakaian

Simpan

14. Data berhasil tersimpan kedalam *database* Aplikasi Transaksi Central Laundry.



Admin Laundry

Selamat Datang Administrator!

Beranda

Tambah Laundry Selesai & Dibayar Hapus

Show 10 entries Search:

| № | Nama Customer | Prioritas # | Berat | Tipe | Tanggal Diterima | Total | Aksi |
|---|---------------|-------------|-------|-----------|---------------------|--------------|------|
| 1 | Amir | 1 | 30 | Pakaian | 2019-08-21 19:45:20 | Rp 300.000 | Edit |
| 2 | Anto | 16 | 12 | Selimut | 2019-08-07 09:10:22 | Rp 180.000 | Edit |
| 3 | Rudi | 14 | 54 | Selimut | 2019-07-28 21:59:58 | Rp 810.000 | Edit |
| 4 | Sarwan | 10 | 30 | Bed Cover | 2019-07-23 22:30:45 | Rp 750.000 | Edit |
| 5 | Sarwan Hamid | 13 | 45 | Bed Cover | 2019-07-29 14:00:07 | Rp 1,125.000 | Edit |

- Kemudian buka halaman statistik *haproxy load balancer* untuk mengetahui pembagian beban yang dilakukan oleh *haproxy load balancer*.

HAProxy version 1.8.8-1ubuntu0.4, released 2019/01/24
Statistics Report for pid 1906

> General process information

pid = 1906 (process #1, nrbproc = 1, nrbthread = 1)
 uptime = 0d 0h03m30s
 system limits: memmax = unlimited; ulimit-n = 4035
 maxsock = 4035; maxconn = 2000; maxpipes = 0
 current conn = 2; current pipes = 0/0; conn rate = 2/sec
 Running tasks: 1/9; idle = 100 %

Legend:
 active UP
 active UP, going down
 active DOWN, going up
 active or backup DOWN
 active or backup DOWN for maintenance (MAINT)
 backup UP
 backup UP, going down
 backup DOWN, going up
 not checked
 active or backup SOFT STOPPED for maintenance

Display option:
 External resources:
 • [Primary site](#)
 • [Updates \(v1.8\)](#)
 • [Offline manual](#)
 • [Refresh now](#)
 • [Subscribed](#)

| cluster | queue | Queue | | Session rate | | Sessions | | | Bytes | | Denied | | Errors | | Warnings | | Status | LastChk | Server | | | | | | | | |
|-------------|-------|-------|-----|--------------|-----|----------|-------|-------|-------|------|--------|-------|--------|------|----------|------|--------|----------|---------------|------|-------|------|-----|-----|-----|-----|----------|
| | | Cur | Max | Limit | Cur | Max | Limit | Total | LbTot | Last | In | Out | Req | Resp | Req | Conn | | | Resp | Retr | Redis | Wght | Act | Bck | Chk | Dwn | Downtime |
| Frontend | | 0 | 2 | - | 0 | 1 | 2 000 | 2 | | 530 | 1 246 | 0 | 0 | 0 | 0 | 0 | 0 | OPEN | | | | | | | | | |
| galera-ob01 | 0 0 | - | 0 | 1 | 0 | 1 | - | 1 | 1 | 58s | 242 | 132 | 0 | 0 | 0 | 0 | 0 | 3m39s UP | L7OK:0 in 2ms | 1 | Y | - | 0 | 0 | 0s | - | |
| galera-ob02 | 0 0 | - | 0 | 1 | 0 | 1 | - | 1 | 1 | 58s | 297 | 1 114 | 0 | 0 | 0 | 0 | 0 | 3m39s UP | L7OK:0 in 1ms | 1 | Y | - | 0 | 0 | 0s | - | |
| galera-ob03 | 0 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 7s | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3m39s UP | L7OK:0 in 2ms | 1 | Y | - | 0 | 0 | 0s | - | |
| Backend | 0 0 | 0 | 2 | 0 | 1 | 200 | 2 | 2 | 58s | 530 | 1 246 | 0 | 0 | 0 | 0 | 0 | 0 | 3m39s UP | | 3 | 3 | 0 | 0 | 0 | 0s | | |

| cluster | queue | Queue | | Session rate | | Sessions | | | Bytes | | Denied | | Errors | | Warnings | | Status | LastChk | Server | | | | | | | | |
|----------|-------|-------|-----|--------------|-----|----------|-------|-------|-------|-------|---------|---------|--------|------|----------|------|--------|----------|--------|------|-------|------|-----|-----|-----|-----|----------|
| | | Cur | Max | Limit | Cur | Max | Limit | Total | LbTot | Last | In | Out | Req | Resp | Req | Conn | | | Resp | Retr | Redis | Wght | Act | Bck | Chk | Dwn | Downtime |
| Frontend | | 2 | 4 | - | 2 | 2 | 2 000 | 16 | | 7 296 | 242 209 | 0 | 0 | 0 | 0 | 0 | 0 | OPEN | | | | | | | | | |
| Backend | 0 0 | 0 | 0 | 0 | 0 | 0 | 200 | 0 | 0 | 5s | 7 296 | 242 209 | 0 | 0 | 0 | 0 | 0 | 3m39s UP | | 0 | 0 | 0 | 0 | 0 | 0 | 0s | |