INSTITUTO INFNET

ESCOLA SUPERIOR DE TECNOLOGIA DA INFORMAÇÃO

GRADUAÇÃO EM REDES DE COMPUTADORES

ARQUITETURA E INFRAESTRUTURA DE APLICAÇÕES

Projeto de bloco

TP5

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1. Enunciado

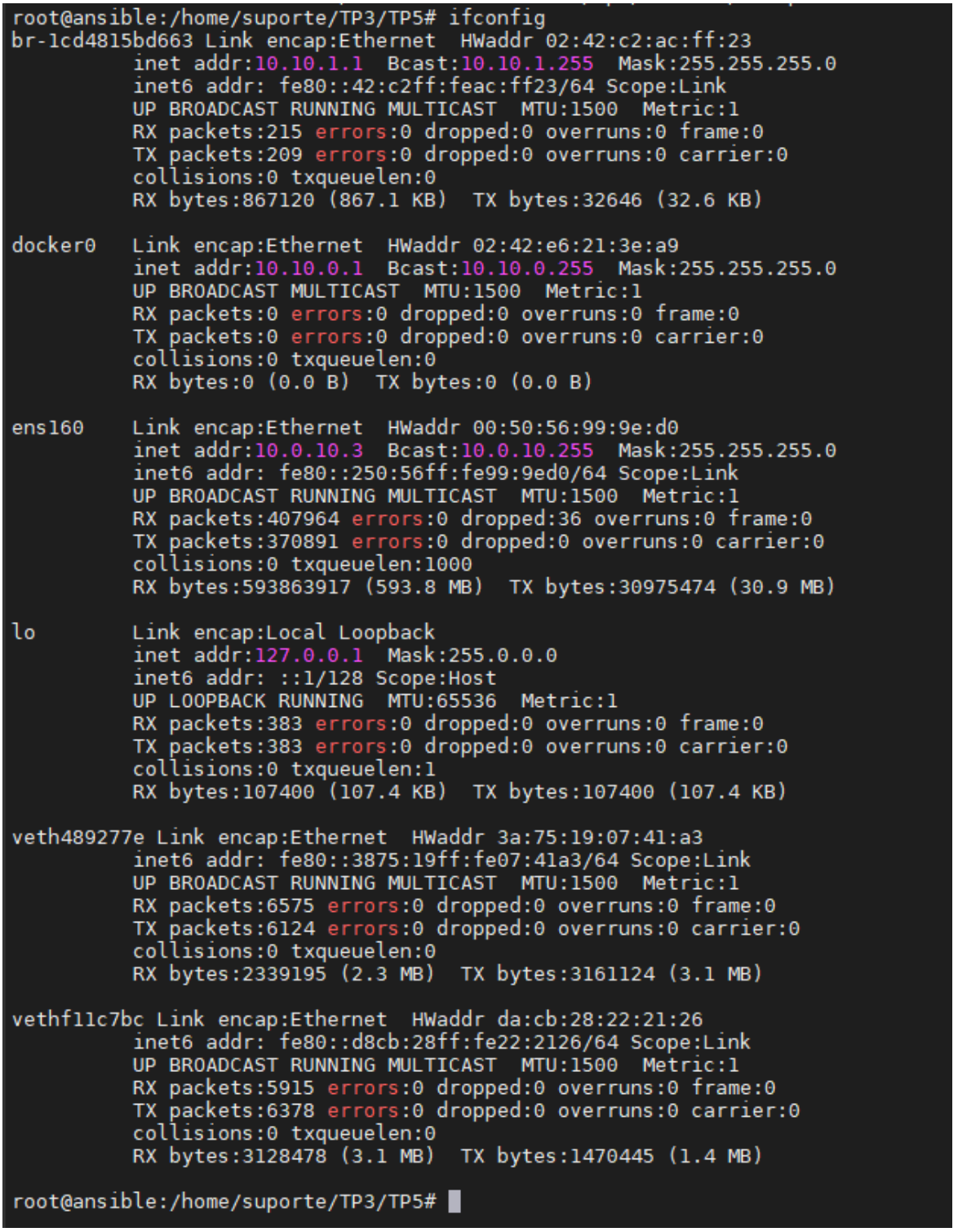
Apresente um playbook Ansible que execute uma aplicação distribuída, **composta por dois ou mais containers Docker ou VMs em um host vSphere**. Seu playbook deve ser disponibilizado em um repositório GitHub, e seu trabalho deve incluir a URL para o repositório. Seu trabalho também deve apresentar o resultado da execução do playbook.

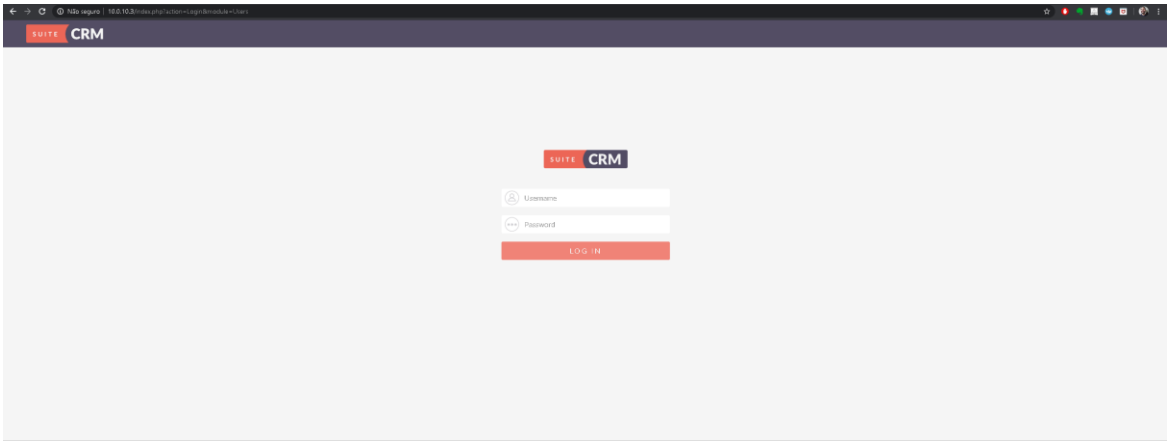
A entrega deve ser feita no Moodle em um documento pdf.

2. Aplicação sobre container

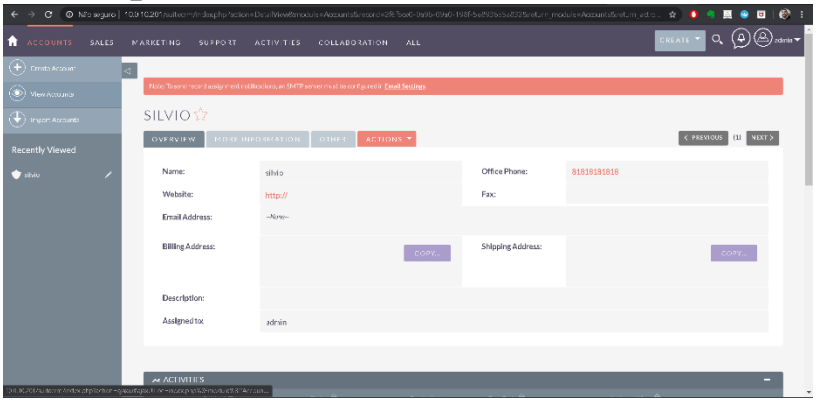
```
root@ansible:/home/suporte/TP3/TP5# docker volume create --name mariadb_data
mariadb_data
root@ansible:/home/suporte/TP3/TP5# docker run -d --name mariadb \
> -e ALLOW_EMPTY_PASSWORD=yes \
>  -e MARIADB_USER=bn_suitecrm \
>  -e MARIADB_DATABASE=bitnami_suitecrm \
>  --net suitecrm-tier \
>  --volume mariadb_data:/bitnami \
>  bitnami/mariadb:latest
Unable to find image 'bitnami/mariadb:latest' locally
latest: Pulling from bitnami/mariadb
6729c2f8f6ae: Pull complete
4a6accbad06c: Pull complete
8e1a6ded2bf0: Pull complete
bcc599b4b879: Pull complete
9c87ad5c118c: Pull complete
1c32704e000c: Pull complete
07d8104401b7: Pull complete
2987f15096d9: Pull complete
acce88089e21: Pull complete
Digest: sha256:2d955cf8768edaf059be5d0ea7bbecb75c52d7fe7847db7704ed5d4c22378662
Status: Downloaded newer image for bitnami/mariadb:latest
4a38bc9727dbbd8d673f91ff77853079946ddaa69e88c7514dcceac72e5e9e0f
root@ansible:/home/suporte/TP3/TP5# docker volume create --name suitecrm_data
suitecrm_data
root@ansible:/home/suporte/TP3/TP5# docker run -d --name suitecrm -p 80:80 -p 443:443 \
>  -e ALLOW_EMPTY_PASSWORD=yes \
>  -e SUITECRM_DATABASE_USER=bn_suitecrm \
>  -e SUITECRM_DATABASE_NAME=bitnami_suitecrm \
>  --net suitecrm-tier \
>  --volume suitecrm_data:/bitnami \
>  bitnami/suitecrm:latest
Unable to find image 'bitnami/suitecrm:latest' locally
latest: Pulling from bitnami/suitecrm
f741ee3cf64f: Pull complete
962ca6810219: Pull complete
87559a33b44a: Pull complete
859e3e60c153: Pull complete
e17a16a2c497: Pull complete
02fd41ffa2b8: Pull complete
13b63c51b64d: Pull complete
03f2f5702a72: Pull complete
78716b6a9002: Pull complete
c798749b43a9: Pull complete
8ab997f6c3c9: Pull complete
a4808e84d0a3: Pull complete
488f4253110b: Pull complete
9911bf770b30: Pull complete
c37cd520f3a0: Pull complete
008fa6dc13a0: Pull complete
Digest: sha256:c5de5ea6b8133929282b1f9f2475c9d06231902df72569822ac9662fcaff22ff
Status: Downloaded newer image for bitnami/suitecrm:latest
f306df6ebcbf6ac2cddccfb8b768d548853729f86e898920486a50931425a31c
```

```
root@ansible:/home/suporte/TP3/TP5# docker image ls
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
bitnami/suitecrm    latest              dc7e398d44fe        11 hours ago        939MB
bitnami/mariadb     latest              59b757e6c889        17 hours ago        288MB
hello-world         latest              fce289e99eb9        15 months ago       1.84kB
root@ansible:/home/suporte/TP3/TP5# docker container ls
CONTAINER ID        IMAGE                     COMMAND                  CREATED             STATUS              PORTS                                      NAMES
f306df6ebcbf        bitnami/suitecrm:latest   "/app-entrypoint.sh …"   2 minutes ago       Up 2 minutes        0.0.0.0:80->80/tcp, 0.0.0.0:443->443/tcp   suitecrm
4a38bc9727db        bitnami/mariadb:latest    "/opt/bitnami/script…"   3 minutes ago       Up 3 minutes        3306/tcp                                   mariadb
root@ansible:/home/suporte/TP3/TP5#
```


root@ansible:/home/suporte/TP3/TP5# ifconfig
br-1cd4815bd663 Link encap:Ethernet HWaddr 02:42:c2:ac:ff:23
inet addr:10.10.1.1 Bcast:10.10.1.255 Mask:255.255.255.0
inet6 addr: fe80::42:c2ff:feac:ff23/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:215 errors:0 dropped:0 overruns:0 frame:0
TX packets:209 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:867120 (867.1 KB) TX bytes:32646 (32.6 KB)
docker0 Link encap:Ethernet HWaddr 02:42:e6:21:3e:a9
inet addr:10.10.0.1 Bcast:10.10.0.255 Mask:255.255.255.0
UP BROADCAST MULTICAST MTU:1500 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
ens160 Link encap:Ethernet HWaddr 00:50:56:99:9e:d0
inet addr:10.0.10.3 Bcast:10.0.10.255 Mask:255.255.255.0
inet6 addr: fe80::250:56ff:fe99:9ed0/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:407964 errors:0 dropped:36 overruns:0 frame:0
TX packets:370891 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:593863917 (593.8 MB) TX bytes:30975474 (30.9 MB)
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
inet6 addr: ::1/128 Scope:Host
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:383 errors:0 dropped:0 overruns:0 frame:0
TX packets:383 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1
RX bytes:107400 (107.4 KB) TX bytes:107400 (107.4 KB)
veth489277e Link encap:Ethernet HWaddr 3a:75:19:07:41:a3
inet6 addr: fe80::3875:19ff:fe07:41a3/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:6575 errors:0 dropped:0 overruns:0 frame:0
TX packets:6124 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:2339195 (2.3 MB) TX bytes:3161124 (3.1 MB)
vethf11c7bc Link encap:Ethernet HWaddr da:cb:28:22:21:26
inet6 addr: fe80::d8cb:28ff:fe22:2126/64 Scope:Link
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:5915 errors:0 dropped:0 overruns:0 frame:0
TX packets:6378 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:3128478 (3.1 MB) TX bytes:1470445 (1.4 MB)
root@ansible:/home/suporte/TP3/TP5#



3. Aplicação SUITECRM



A aplicação selecionada foi o SuiteCRM que é um CRM opensource.
Neste momento será implementando somente um webserver e um banco de dados, porém no decorrer do projeto será implementado um loadbalancer fazendo o balanceamento de carga para 3 webservers e 2 bancos de dados em alta disponibilidade.

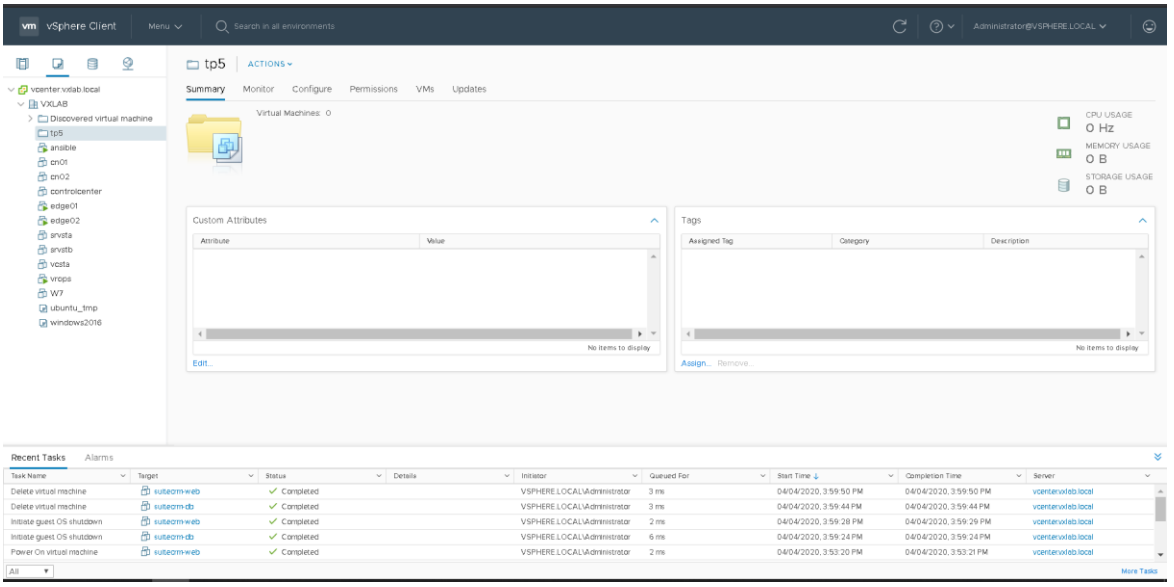
4. Infraestrutura da aplicação

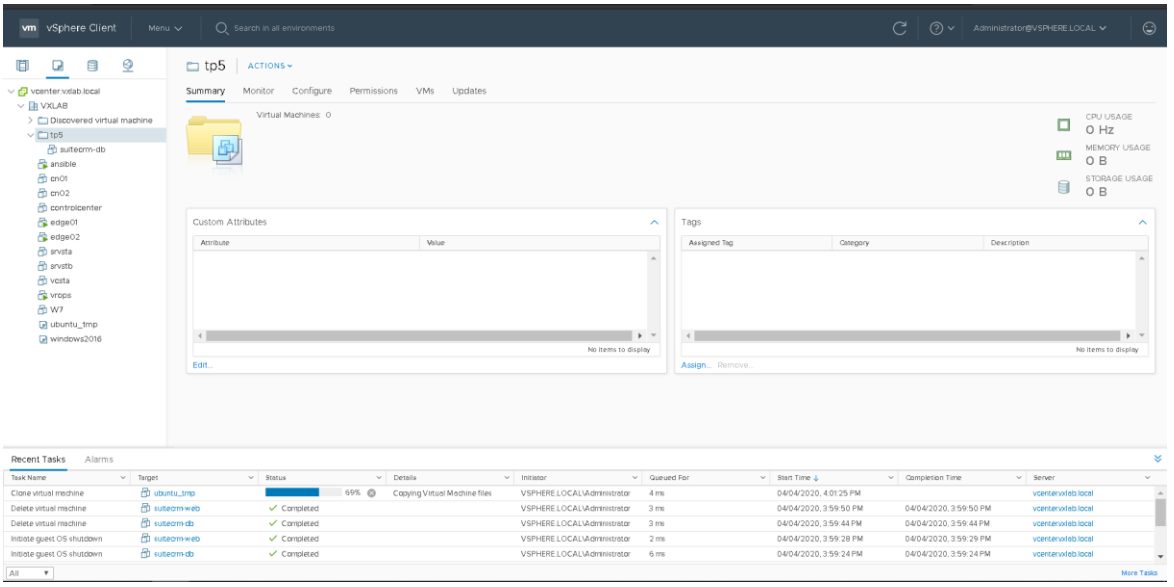
Para este TP foi selecionado a implementação da solução em um ambiente VMware vCenter com 3 hosts ESXI com balanceamento de carga e alta disponibilidade.

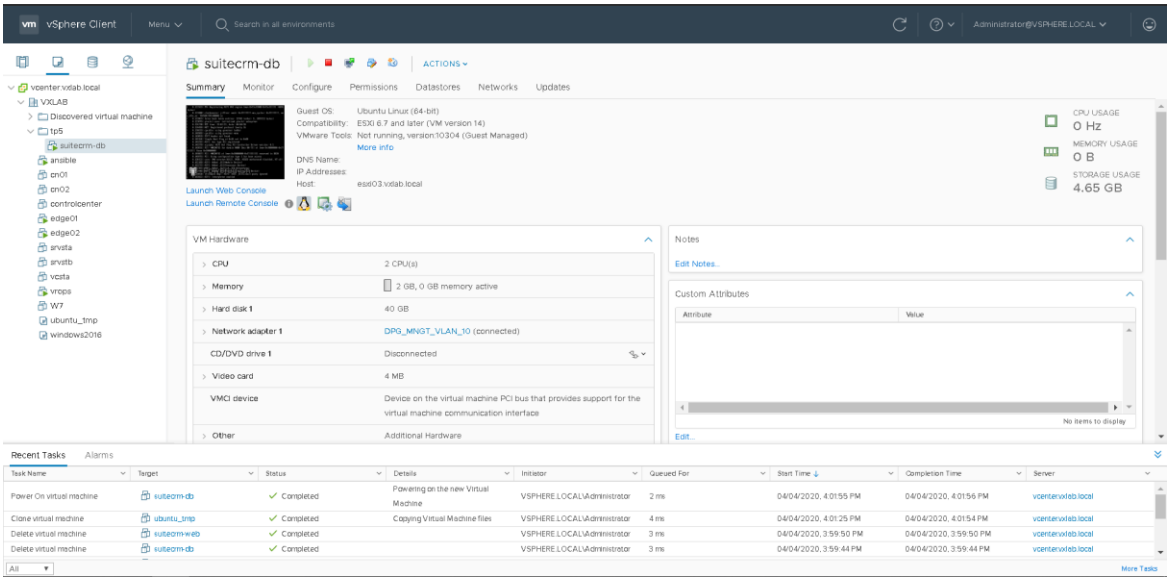
Foi utilizando um playbook para provisionar os servidores de banco de dados e webserver para o suitecrm.

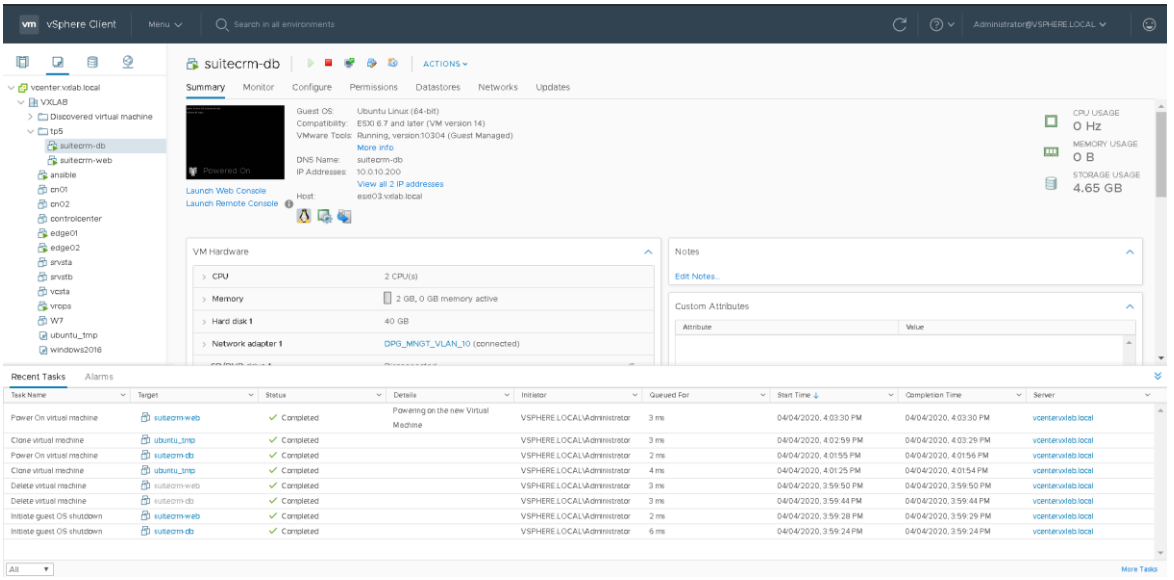
```
root@ansible:~# cat deploy-vms.yml
---
- hosts: localhost
  gather_facts: no
  vars:
    vcenter_server: "10.0.10.100"
    vcenter_user: "administrator@vsphere.local"
    vcenter_pass: "VMware1!"
    datacenter_name: "VXLAB"
    cluster_name: "CL1"
  tasks:
  - name: Create suitecrm-db
    vmware_guest:
      hostname: "{{ vcenter_server }}"
      username: "{{ vcenter_user }}"
      password: "{{ vcenter_pass }}"
      validate_certs: False
      name: suitecrm-db
      template: ubuntu_tmp
      datacenter: "{{ datacenter_name }}"
      folder: /tp5
      cluster: "{{ cluster_name }}"
      datastore: "SYNO_02"
      networks:
      - name: DPG_MNGT_VLAN_10
        ip: 10.0.10.200
        netmask: 255.255.255.0
        gateway: 10.0.10.254
        type: static
        dns_servers: 10.0.10.1
      customization:
        hostname: "suitecrm-db"
        dns_servers:
        - 10.0.10.1
      state: poweredon
      wait_for_ip_address: yes
    delegate_to: localhost
```

```yaml
- hosts: localhost
  gather_facts: no
  vars:
    vcenter_server: "10.0.10.100"
    vcenter_user: "administrator@vsphere.local"
    vcenter_pass: "VMware1!"
    datacenter_name: "VXLAB"
    cluster_name: "CL1"
  tasks:
  - name: Create suitecrm-web
    vmware_guest:
      hostname: "{{ vcenter_server }}"
      username: "{{ vcenter_user }}"
      password: "{{ vcenter_pass }}"
      validate_certs: False
      name: suitecrm-web
      template: ubuntu_tmp
      datacenter: "{{ datacenter_name }}"
      folder: /tp5
      cluster: "{{ cluster_name }}"
      datastore: "SYNO_01"
      networks:
      - name: DPG_MNGT_VLAN_10
        ip: 10.0.10.201
        netmask: 255.255.255.0
        gateway: 10.0.10.254
        type: static
        dns_servers: 10.0.10.1
      customization:
        hostname: "suitecrm-web"
        dns_servers:
        - 10.0.10.1
      state: poweredon
      wait_for_ip_address: yes
    delegate_to: localhost
```




vSphere Client
Menu
Search in all environments
Administrator@VSPHERE.LOCAL
tp5
ACTIONS
Summary
Monitor
Configure
Permissions
VMs
Updates
Virtual Machines : 0
CPU USAGE
0 Hz
MEMORY USAGE
0 B
STORAGE USAGE
0 B
Custom Attributes
Attribute
Value
No items to display
Edit...
Tags
Assigned Tag
Category
Description
No items to display
Assign...
Remove...
Recent Tasks
Alarms
Task Name
Target
Status
Details
Initiator
Queued For
Start Time
Completion Time
Server
Clone virtual machine
ubuntu_tmp
69%
Copying Virtual Machine files
VSPHERE.LOCAL\Administrator
4 ms
04/04/2020, 4:01:25 PM
vcenter.vxlab.local
Delete virtual machine
suitecrm-web
Completed
VSPHERE.LOCAL\Administrator
3 ms
04/04/2020, 3:59:50 PM
04/04/2020, 3:59:50 PM
Delete virtual machine
suitecrm-db
Completed
VSPHERE.LOCAL\Administrator
3 ms
04/04/2020, 3:59:44 PM
04/04/2020, 3:59:44 PM
Initiate guest OS shutdown
suitecrm-web
Completed
VSPHERE.LOCAL\Administrator
2 ms
04/04/2020, 3:59:28 PM
04/04/2020, 3:59:29 PM
Initiate guest OS shutdown
suitecrm-db
Completed
VSPHERE.LOCAL\Administrator
6 ms
04/04/2020, 3:59:24 PM
04/04/2020, 3:59:24 PM
More Tasks


vSphere Client
Menu
Search in all environments
Administrator@VSPHERE.LOCAL
suitecrm-db
ACTIONS
Summary
Monitor
Configure
Permissions
Datastores
Networks
Updates
Guest OS: Ubuntu Linux (64-bit)
Compatibility: ESXi 6.7 and later (VM version 14)
VMware Tools: Not running, version:10304 (Guest Managed)
More info
DNS Name:
IP Addresses:
Host: esxi03.vxlab.local
Launch Web Console
Launch Remote Console
CPU USAGE
0 Hz
MEMORY USAGE
0 B
STORAGE USAGE
4.65 GB
VM Hardware
CPU
2 CPU(s)
Memory
2 GB, 0 GB memory active
Hard disk 1
40 GB
Network adapter 1
DPG_MNGT_VLAN_10 (connected)
CD/DVD drive 1
Disconnected
Video card
4 MB
VMCI device
Device on the virtual machine PCI bus that provides support for the virtual machine communication interface
Other
Additional Hardware
Notes
Edit Notes...
Custom Attributes
Attribute
Value
No items to display
Edit...
Recent Tasks
Alarms
Task Name
Target
Status
Details
Initiator
Queued For
Start Time
Completion Time
Server
Power On virtual machine
suitecrm-db
Completed
Powering on the new Virtual Machine
VSPHERE.LOCAL\Administrator
2 ms
04/04/2020, 4:01:55 PM
04/04/2020, 4:01:56 PM
vcenter.vxlab.local
Clone virtual machine
ubuntu_tmp
Completed
Copying Virtual Machine files
VSPHERE.LOCAL\Administrator
4 ms
04/04/2020, 4:01:25 PM
04/04/2020, 4:01:54 PM
Delete virtual machine
suitecrm-web
Completed
VSPHERE.LOCAL\Administrator
3 ms
04/04/2020, 3:59:50 PM
04/04/2020, 3:59:50 PM
Delete virtual machine
suitecrm-db
Completed
VSPHERE.LOCAL\Administrator
3 ms
04/04/2020, 3:59:44 PM
04/04/2020, 3:59:44 PM
More Tasks




```
root@ansible:~# ansible-playbook deploy-vms.yml
[WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'

PLAY [localhost] ***************************************************************************************************************************************************

TASK [Create suitecrm-db] ******************************************************************************************************************************************
changed: [localhost -> localhost]

PLAY [localhost] ***************************************************************************************************************************************************

TASK [Create suitecrm-web] *****************************************************************************************************************************************
changed: [localhost -> localhost]

PLAY RECAP *********************************************************************************************************************************************************
localhost                  : ok=2    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

root@ansible:~#
```

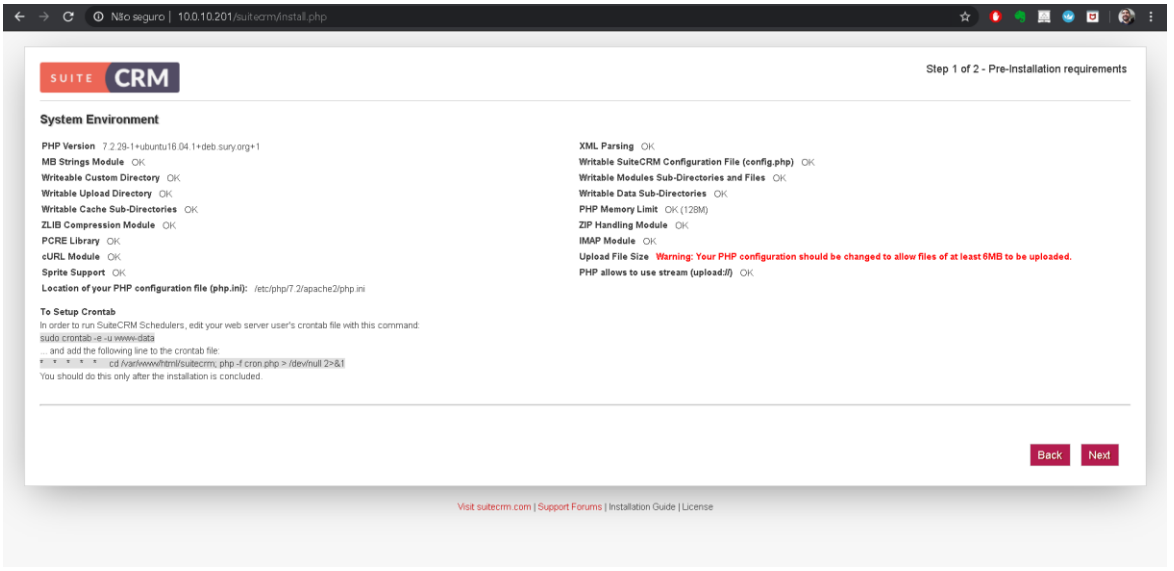
5. Provisionamento da aplicação

Foi criado um playbook para a preparação dos servidores suitecrm-db com IP 10.0.10.200 e suitecrm-web com IP 10.0.10.201.

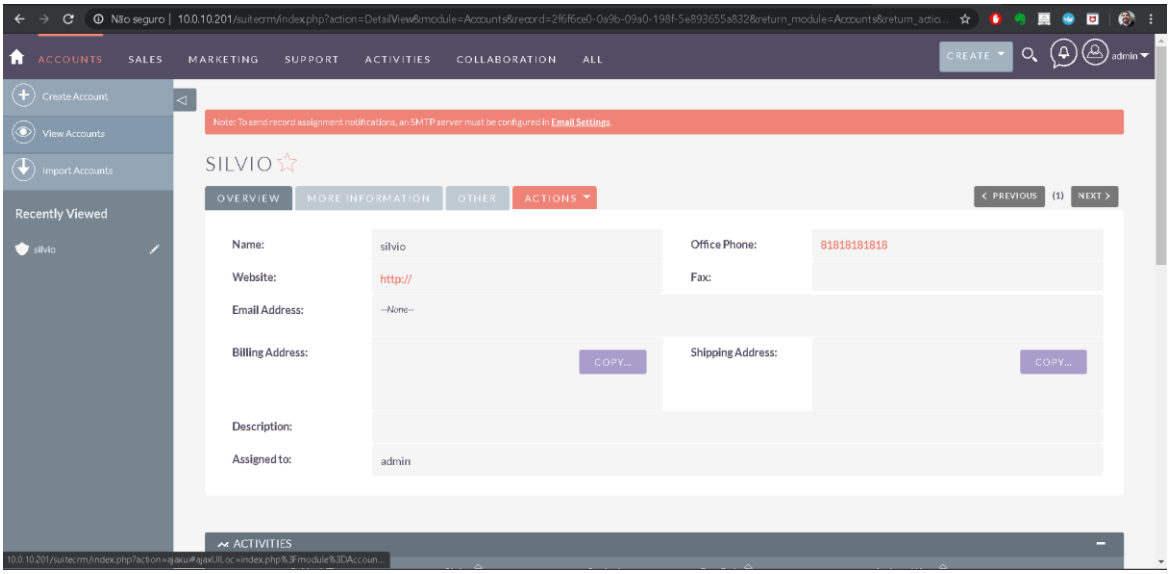
```
suporte@ansible:~/TP3/TP5$ ansible-playbook playbook.yml -i hosts -u root
[DEPRECATION WARNING]: The TRANSFORM_INVALID_GROUP_CHARS settings is set to allow bad characters in group names by default, this will change, but still be user
configurable on deprecation. This feature will be removed in version 2.10. Deprecation warnings can be disabled by setting deprecation_warnings=False in
ansible.cfg.
[WARNING]: Invalid characters were found in group names but not replaced, use -vvvv to see details

PLAY [all] *********************************************************************************************************************************************************

TASK [install python 2] ********************************************************************************************************************************************
changed: [10.0.10.201]
changed: [10.0.10.200]

PLAY [suitecrm-web] ************************************************************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************************************************************
[DEPRECATION WARNING]: Distribution Ubuntu 16.04 on host 10.0.10.201 should use /usr/bin/python3, but is using /usr/bin/python for backward compatibility with
prior Ansible releases. A future Ansible release will default to using the discovered platform python for this host. See
https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information. This feature will be removed in version 2.12.
Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
ok: [10.0.10.201]

TASK [basic : Update apt cache] ************************************************************************************************************************************
ok: [10.0.10.201]

TASK [basic : Install required software] ***************************************************************************************************************************
[DEPRECATION WARNING]: Invoking "apt" only once while using a loop via squash_actions is deprecated. Instead of using a loop to supply multiple items and
specifying `name: "{{ item }}"`, please use `name: ['python3', 'unzip']` and remove the loop. This feature will be removed in version 2.11. Deprecation warnings
can be disabled by setting deprecation_warnings=False in ansible.cfg.
ok: [10.0.10.201] => (item=['python3', 'unzip'])

TASK [php : Update apt cache] **************************************************************************************************************************************
ok: [10.0.10.201]

TASK [php : Install required software] *****************************************************************************************************************************
[DEPRECATION WARNING]: Invoking "apt" only once while using a loop via squash_actions is deprecated. Instead of using a loop to supply multiple items and
specifying `name: "{{ item }}"`, please use `name: ['apache2', 'php7.2-mysql', 'mariadb-client', 'php7.2', 'libapache2-mod-php7.2', 'python-mysqldb', 'zip',
'libapache2-mod-php7.2', 'php7.2-common', 'php7.2-mysql', 'php7.2-gmp', 'php7.2-curl', 'php7.2-intl', 'php7.2-mbstring', 'php7.2-xmlrpc', 'php7.2-gd',
'php7.2-bcmath', 'php7.2-imap', 'php7.2-xml', 'php7.2-cli', 'php7.2-zip', 'unzip', 'php-xml-parser']` and remove the loop. This feature will be removed in version
2.11. Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
changed: [10.0.10.201] => (item=['apache2', 'php7.2-mysql', 'mariadb-client', 'php7.2', 'libapache2-mod-php7.2', 'python-mysqldb', 'zip', 'libapache2-mod-php7.2',
php7.2-common', 'php7.2-mysql', 'php7.2-gmp', 'php7.2-curl', 'php7.2-intl', 'php7.2-mbstring', 'php7.2-xmlrpc', 'php7.2-gd', 'php7.2-bcmath', 'php7.2-imap', 'php7.2
```

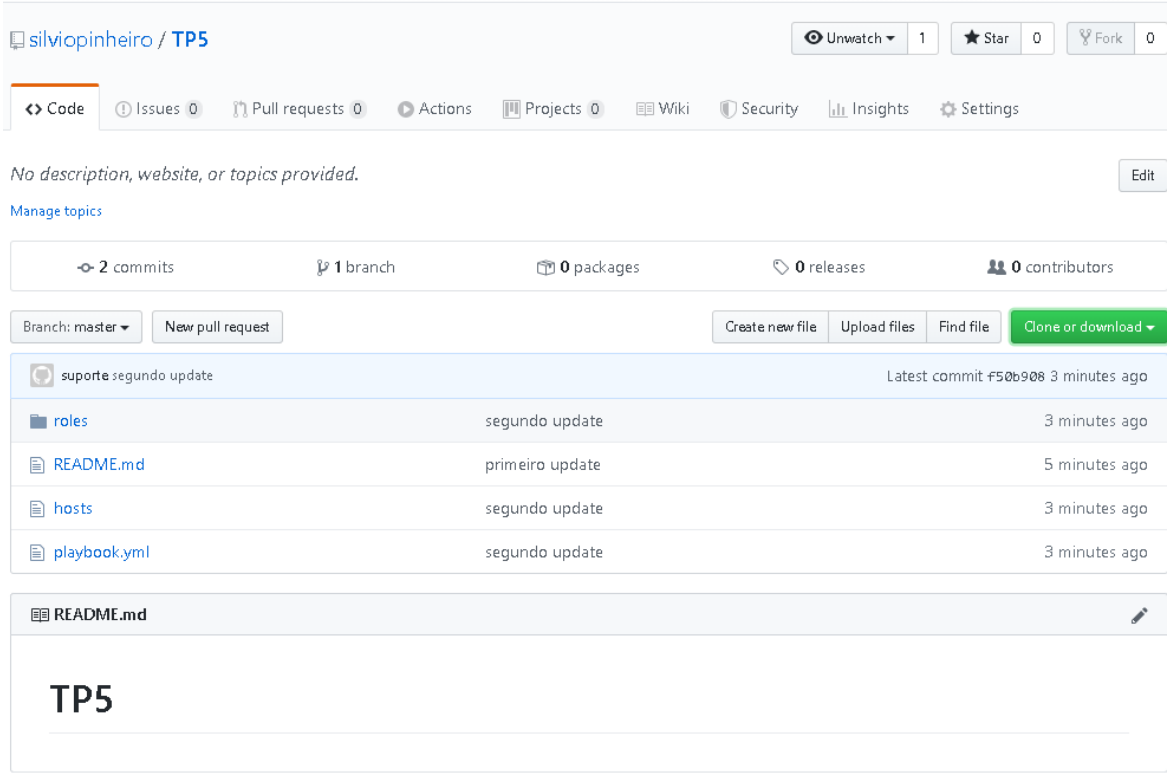
```
TASK [php : Install required software] *****************************************************************************************************************************
[DEPRECATION WARNING]: Invoking "apt" only once while using a loop via squash_actions is deprecated. Instead of using a loop to supply multiple items and
specifying `name: "{{ item }}"`, please use `name: ['apache2', 'php7.2-mysql', 'mariadb-client', 'php7.2', 'libapache2-mod-php7.2', 'python-mysqldb', 'zip',
'libapache2-mod-php7.2', 'php7.2-common', 'php7.2-mysql', 'php7.2-gmp', 'php7.2-curl', 'php7.2-intl', 'php7.2-mbstring', 'php7.2-xmlrpc', 'php7.2-gd',
'php7.2-bcmath', 'php7.2-imap', 'php7.2-xml', 'php7.2-cli', 'php7.2-zip', 'unzip', 'php-xml-parser']` and remove the loop. This feature will be removed in version
2.11. Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
changed: [10.0.10.201] => (item=['apache2', 'php7.2-mysql', 'mariadb-client', 'php7.2', 'libapache2-mod-php7.2', 'python-mysqldb', 'zip', 'libapache2-mod-php7.2', '
php7.2-common', 'php7.2-mysql', 'php7.2-gmp', 'php7.2-curl', 'php7.2-intl', 'php7.2-mbstring', 'php7.2-xmlrpc', 'php7.2-gd', 'php7.2-bcmath', 'php7.2-imap', 'php7.2
-xml', 'php7.2-cli', 'php7.2-zip', 'unzip', 'php-xml-parser'])

TASK [suitecrm : Download SuiteCRM] ********************************************************************************************************************************
changed: [10.0.10.201]

TASK [suitecrm : Extract SuiteCRM] *********************************************************************************************************************************
changed: [10.0.10.201]

TASK [suitecrm : Change the dir] ***********************************************************************************************************************************
changed: [10.0.10.201]

TASK [suitecrm : Change the permission] ****************************************************************************************************************************
[WARNING]: Consider using the file module with owner rather than running 'chown'.  If you need to use command because file is insufficient you can add 'warn:
false' to this command task or set 'command_warnings=False' in ansible.cfg to get rid of this message.
changed: [10.0.10.201]

TASK [suitecrm : Change the permission] ****************************************************************************************************************************
[WARNING]: Consider using 'become', 'become_method', and 'become_user' rather than running sudo
changed: [10.0.10.201]

PLAY [suitecrm-db] *************************************************************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************************************************************
[DEPRECATION WARNING]: Distribution Ubuntu 16.04 on host 10.0.10.200 should use /usr/bin/python3, but is using /usr/bin/python for backward compatibility with
prior Ansible releases. A future Ansible release will default to using the discovered platform python for this host. See
https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information. This feature will be removed in version 2.12.
Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
ok: [10.0.10.200]

TASK [basic : Update apt cache] ************************************************************************************************************************************
[WARNING]: Updating cache and auto-installing missing dependency: python-apt
ok: [10.0.10.200]
```

```
PLAY [suitecrm-db] *************************************************************************************************************************************************

TASK [Gathering Facts] *********************************************************************************************************************************************
[DEPRECATION WARNING]: Distribution Ubuntu 16.04 on host 10.0.10.200 should use /usr/bin/python3, but is using /usr/bin/python for backward compatibility with
prior Ansible releases. A future Ansible release will default to using the discovered platform python for this host. See
https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information. This feature will be removed in version 2.12.
Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
ok: [10.0.10.200]

TASK [basic : Update apt cache] ************************************************************************************************************************************
[WARNING]: Updating cache and auto-installing missing dependency: python-apt
ok: [10.0.10.200]

TASK [basic : Install required software] ***************************************************************************************************************************
[DEPRECATION WARNING]: Invoking "apt" only once while using a loop via squash_actions is deprecated. Instead of using a loop to supply multiple items and
specifying `name: "{{ item }}"`, please use `name: ['python3', 'unzip']` and remove the loop. This feature will be removed in version 2.11. Deprecation warnings
can be disabled by setting deprecation_warnings=False in ansible.cfg.
changed: [10.0.10.200] => (item=['python3', 'unzip'])

TASK [mysql : Update apt cache] ************************************************************************************************************************************
ok: [10.0.10.200]

TASK [mysql : Install required software] ***************************************************************************************************************************
[DEPRECATION WARNING]: Invoking "apt" only once while using a loop via squash_actions is deprecated. Instead of using a loop to supply multiple items and
specifying `name: "{{ item }}"`, please use `name: ['mariadb-server', 'python3', 'python-mysqldb']` and remove the loop. This feature will be removed in version
2.11. Deprecation warnings can be disabled by setting deprecation_warnings=False in ansible.cfg.
changed: [10.0.10.200] => (item=['mariadb-server', 'python3', 'python-mysqldb'])

TASK [mysql : Create mysql database] *******************************************************************************************************************************
changed: [10.0.10.200]

TASK [mysql : Create mysql user] ***********************************************************************************************************************************
[WARNING]: Module did not set no_log for update_password
changed: [10.0.10.200]

PLAY RECAP *********************************************************************************************************************************************************
10.0.10.200                : ok=8    changed=5    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
10.0.10.201                : ok=11   changed=7    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

suporte@ansible:~/TP3/TP5$
```




```
root@suitecrm-db:~# netstat -nputa
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 0.0.0.0:3306            0.0.0.0:*               LISTEN      15645/mysqld
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      1304/sshd
tcp        0      0 127.0.0.1:6010          0.0.0.0:*               LISTEN      11950/0
tcp        0      0 10.0.10.200:22          172.16.254.8:50732      ESTABLISHED 11952/sshd: root@no
tcp        0      0 10.0.10.200:3306        10.0.10.201:49082       TIME_WAIT   -
tcp        0      0 10.0.10.200:3306        10.0.10.201:49074       TIME_WAIT   -
tcp        0     64 10.0.10.200:22          172.16.254.8:50731      ESTABLISHED 11950/0
tcp6       0      0 :::22                   :::*                    LISTEN      1304/sshd
tcp6       0      0 ::1:6010                :::*                    LISTEN      11950/0
root@suitecrm-db:~#
```



6. Publicação no GITHUB

https://github.com/silviopinheiro/TP5.git