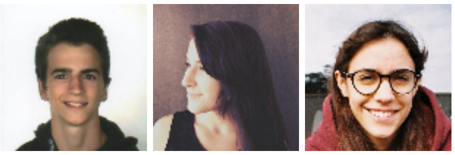
LAB-01-Report-ist189399.md

Webfront Lab README

AGISIT 20201-2022

Authors

Team 20A



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Q01

> *Interpret the Vagranfilethat will be used, explaining, in your own words, what you think the “instructions” in it are supposed to do.*

Line no	Interpretation
5	Assures that the Vagrant provider will be VirtualBox
7-16	Installs the `vagrant-vbguest` and `vagrant-reload plugins`
20	Stops Vagrant from adding an ssh keypair to the guest
21	Vagrant updates GuestAdditions at each start
22	Stops Vagrant from checking for updates on `vagrant up`
25, 54, 84	Defines a VM in a multi-VM environment
26, 55, 85	Configures the OS that will run in the specified box
27, 56, 86	Sets the hostname the machine should have
28, 57, 87	Configures the network the machine will be connected to: a private network with a fixed IP
31, 61, 91	Sets the machine name (the one that appears in the VirtualBox GUI
32, 62, 92	Lets guest machine to use the host's NAT and DNS resolver mechanisms
33, 63, 93	Sets the machine memory (MB)
34, 64, 94	Sets the number of virtual CPUs for the machine
37-45, 67-75, 97-105	Mounts the host `./tools` directory into the guest `/home/vagrant/tools` directory
47-50, 77-78, 107-108	Provisions the machines with configuration scripts. Reloads machine at the end to apply changes
58	Forwards host 8080 port to guest 80

Line no	Interpretation
82	Repeats lines 83 - 109 3 times, replacing `#{i}` by the number of that iteration

Q02

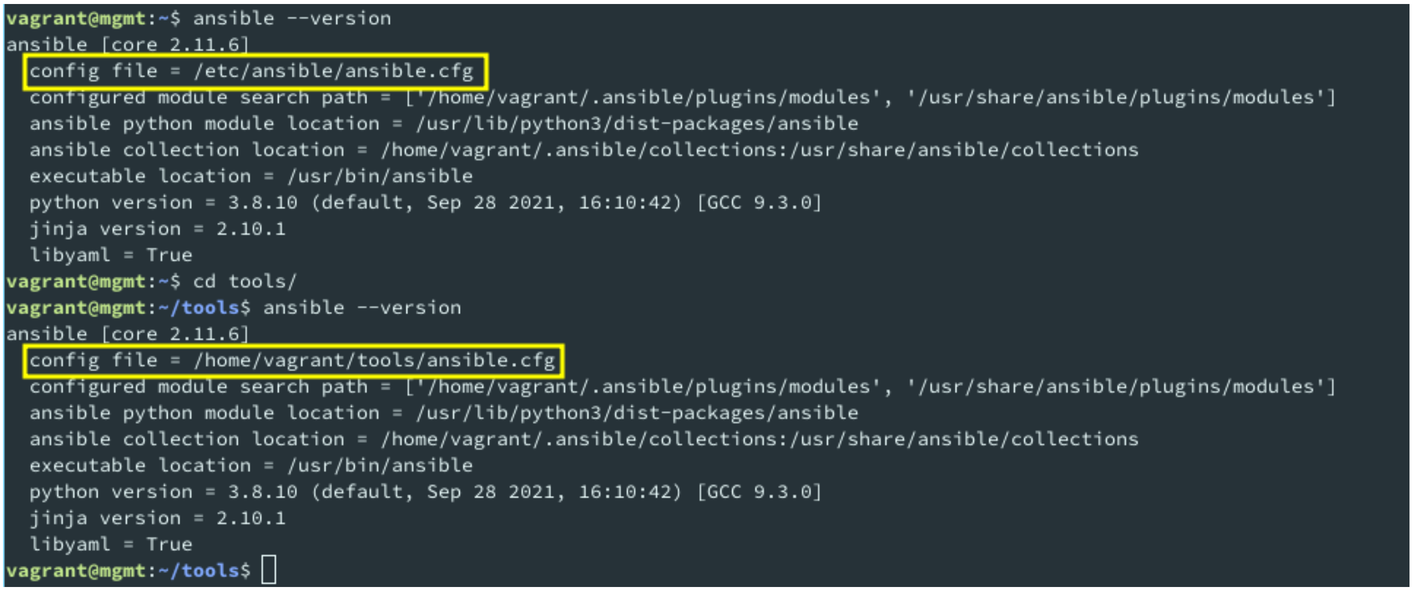
> *Analyze briefly the `bootstrap.sh` the `host\_ip.sh` and the `host\_ssh.sh` to interpret their purpose.*

File	Purpose
`bootstrap.sh`	Installs the required software for the VM to run (`software-properties-common` , `unzip` , `build-essential` , `libssl-dev` , `libffi-dev` , `gnupg` , `python3-dev` , `python3-pip` , `ansible` ,)
`hosts_ip.sh`	Maps IPs to each VM hostname, so that one can access other machines via hostname
`host_ssh.sh`	Sets PasswordAuth to `yes` in sshd configuration file

Q03

> *In what differs calling `ansible --version` from any directory, when compared by calling it from the Project directory you will launch?*

We noticed that the config file path changed in different directories. This happened since in the `ansible.cfg` file present in the `tools` directory took precedence over the default configuration file.



```
vagrant@mgmt:~$ ansible --version
ansible [core 2.11.6]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/vagrant/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /home/vagrant/.ansible/collections:/usr/share/ansible/collections
  executable location = /usr/bin/ansible
  python version = 3.8.10 (default, Sep 28 2021, 16:10:42) [GCC 9.3.0]
  jinja version = 2.10.1
  libyaml = True
vagrant@mgmt:~$ cd tools/
vagrant@mgmt:~/tools$ ansible --version
ansible [core 2.11.6]
  config file = /home/vagrant/tools/ansible.cfg
  configured module search path = ['/home/vagrant/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /home/vagrant/.ansible/collections:/usr/share/ansible/collections
  executable location = /usr/bin/ansible
  python version = 3.8.10 (default, Sep 28 2021, 16:10:42) [GCC 9.3.0]
  jinja version = 2.10.1
  libyaml = True
vagrant@mgmt:~/tools$ 
```

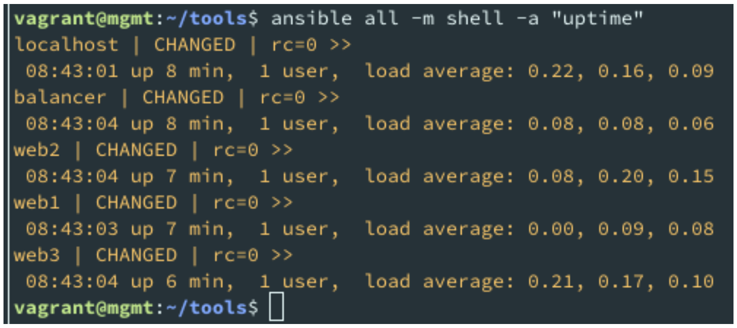
Q04

> *After changing the `Vagrantfile` to accommodate it for launching more web servers, which were the modifications in the files of the Project that you have done? (just tell the name of the file and the lines that were changed)*

- `Vagrantfile:82`
- `tools/inventory.ini:9`
- `tools/inventory.ini:20`
- `tools/inventory.ini:28`

Q05

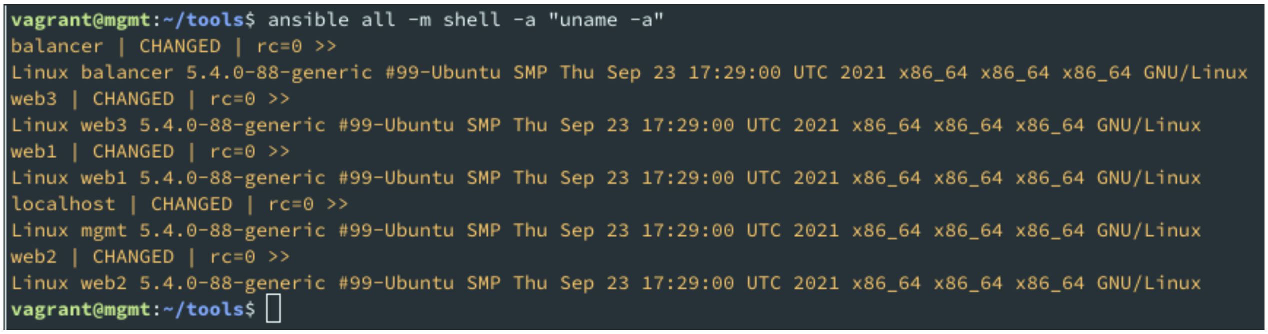
> *Write the result of the command `ansible all -m shell -a "uptime"` for your modified infrastructure.*



```
vagrant@mgmt:~/tools$ ansible all -m shell -a "uptime"
localhost | CHANGED | rc=0 >>
 08:43:01 up 8 min,  1 user,  load average: 0.22, 0.16, 0.09
balancer | CHANGED | rc=0 >>
 08:43:04 up 8 min,  1 user,  load average: 0.08, 0.08, 0.06
web2 | CHANGED | rc=0 >>
 08:43:04 up 7 min,  1 user,  load average: 0.08, 0.20, 0.15
web1 | CHANGED | rc=0 >>
 08:43:03 up 7 min,  1 user,  load average: 0.00, 0.09, 0.08
web3 | CHANGED | rc=0 >>
 08:43:04 up 6 min,  1 user,  load average: 0.21, 0.17, 0.10
vagrant@mgmt:~/tools$ 
```

Q06

> *Write the result of the command `ansible all -m shell -a "uname -a"` for your modified infrastructure*

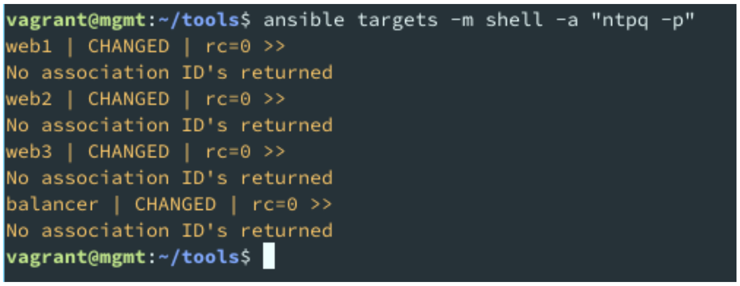


```
vagrant@mgmt:~/tools$ ansible all -m shell -a "uname -a"
balancer | CHANGED | rc=0 >>
Linux balancer 5.4.0-88-generic #99-Ubuntu SMP Thu Sep 23 17:29:00 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
web3 | CHANGED | rc=0 >>
Linux web3 5.4.0-88-generic #99-Ubuntu SMP Thu Sep 23 17:29:00 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
web1 | CHANGED | rc=0 >>
Linux web1 5.4.0-88-generic #99-Ubuntu SMP Thu Sep 23 17:29:00 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
localhost | CHANGED | rc=0 >>
Linux mgmt 5.4.0-88-generic #99-Ubuntu SMP Thu Sep 23 17:29:00 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
web2 | CHANGED | rc=0 >>
Linux web2 5.4.0-88-generic #99-Ubuntu SMP Thu Sep 23 17:29:00 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
vagrant@mgmt:~/tools$ 
```

Q07

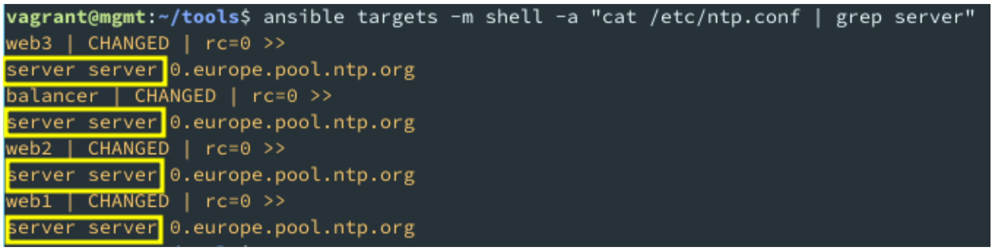
> *When deploying the Network Time Protocol (NTP) you have changed the Reference Time Servers, by modifying the Playbook in order to include a "variable" to be replaced in the NTP configuration file when Ansible runs that Playbook. However, there was a "bug" inadvertently written for this new procedure. Did you find the Bug? What corrections were made, for the NTP service to run?*

When running the template playbook for the first time, the servers would not be able to connect to any NTP server, producing the following output:



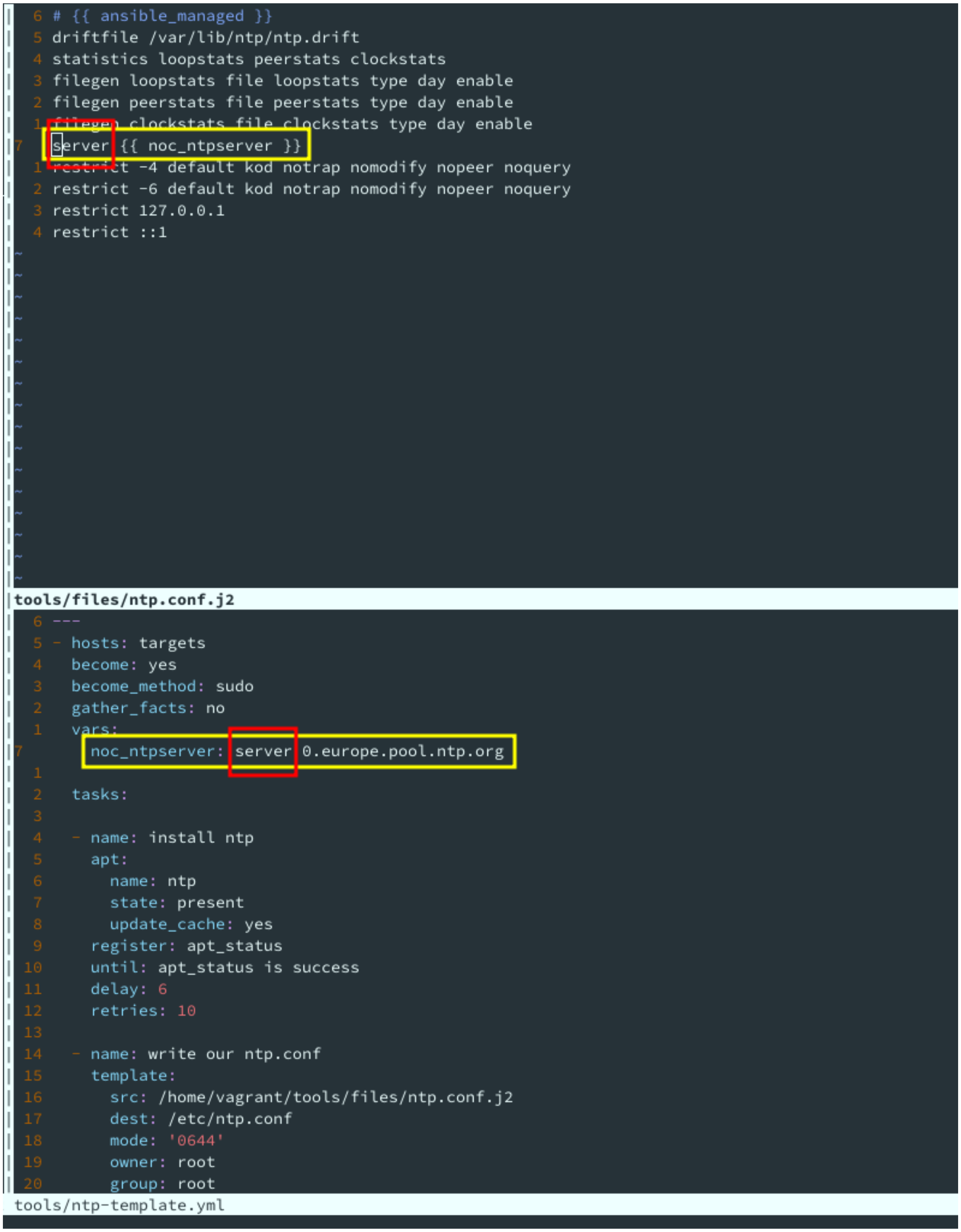
```
vagrant@mgmt:~/tools$ ansible targets -m shell -a "ntpq -p"
web1 | CHANGED | rc=0 >>
No association ID's returned
web2 | CHANGED | rc=0 >>
No association ID's returned
web3 | CHANGED | rc=0 >>
No association ID's returned
balancer | CHANGED | rc=0 >>
No association ID's returned
vagrant@mgmt:~/tools$ 
```

After analyzing the generated configuration file, at `/etc/ntp.conf`, we noticed the following erroneous line:



```
vagrant@mgmt:~/tools$ ansible targets -m shell -a "cat /etc/ntp.conf | grep server"
web3 | CHANGED | rc=0 >>
server server 0.europe.pool.ntp.org
balancer | CHANGED | rc=0 >>
server server 0.europe.pool.ntp.org
web2 | CHANGED | rc=0 >>
server server 0.europe.pool.ntp.org
web1 | CHANGED | rc=0 >>
server server 0.europe.pool.ntp.org
```

Since this file was automatically generated by ansible, we analyzed the playbook and the template file, noticing the following:



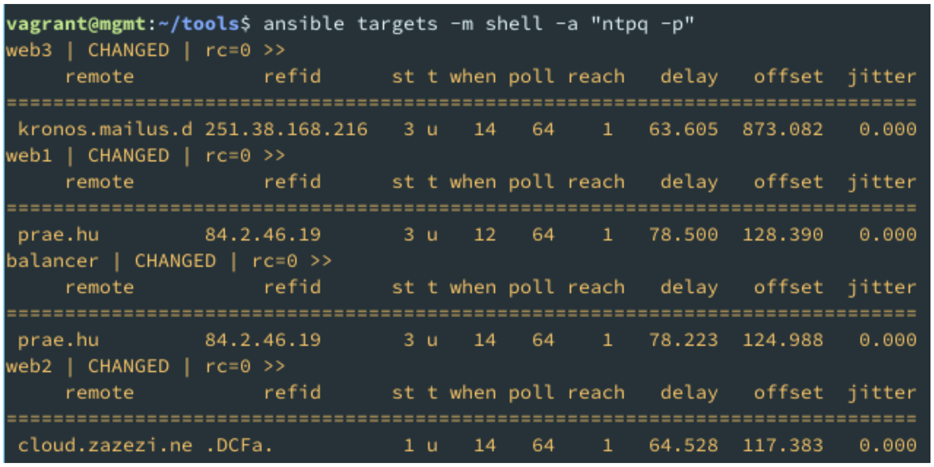
```
# {{ ansible_managed }}
driftfile /var/lib/ntp/ntp.drift
statistics loopstats peerstats clockstats
filegen loopstats file loopstats type day enable
filegen peerstats file peerstats type day enable
filegen clockstats file clockstats type day enable
server {{ noc_ntpserver }}
restrict -4 default kod notrap nomodify nopeer noquery
restrict -6 default kod notrap nomodify nopeer noquery
restrict 127.0.0.1
restrict ::1
```

tools/files/ntp.conf.j2

```
---
- hosts: targets
  become: yes
  become_method: sudo
  gather_facts: no
  vars:
    noc_ntpserver: server 0.europe.pool.ntp.org

  tasks:

    - name: install ntp
      apt:
        name: ntp
        state: present
        update_cache: yes
      register: apt_status
      until: apt_status is success
      delay: 6
      retries: 10

    - name: write our ntp.conf
      template:
        src: /home/vagrant/tools/files/ntp.conf.j2
        dest: /etc/ntp.conf
        mode: '0644'
        owner: root
        group: root
```

tools/ntp-template.yml

The error was caused since both the template and the variable had the `server` keyword, making it duplicate in the final configuration file. By removing that keyword from the variable value, in the `tools/ntp-template.yml` file, we were able to fix this error and have a correct output:



```
vagrant@mgmt:~/tools$ ansible targets -m shell -a "ntpq -p"
web3 | CHANGED | rc=0 >>
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
 kronos.mailus.d 251.38.168.216   3 u   14   64    1   63.605  873.082   0.000
web1 | CHANGED | rc=0 >>
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
 prae.hu         84.2.46.19       3 u   12   64    1   78.500  128.390   0.000
balancer | CHANGED | rc=0 >>
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
 prae.hu         84.2.46.19       3 u   14   64    1   78.223  124.988   0.000
web2 | CHANGED | rc=0 >>
     remote           refid      st t when poll reach   delay   offset  jitter
==============================================================================
 cloud.zazezi.ne .DCFa.           1 u   14   64    1   64.528  117.383   0.000
```

Q08

> *You ran the `site_(docker/vbox).yml` Playbook. After running it for the second time, in case there were nor errors the would prevent all tasks to complete, can you describe: What happened? What did you find different (or not)?*

In the first run, the ansible `PLAY RECAP` showed that all servers were changed by the playbook. In subsequent runs, no servers were changed. This happened since these instructions are idempotent. Since the machines were already in the desired state, there was no need to apply new changes.

Q09

> *When the system was deployed, when hitting the refresh button on the web browser (forcing with the Shift key): Did something change?*

Yes, the HTML page showed that it was being served from different servers and different IPs, proving that the load balancer was correctly functioning.

Q10

> *When using the Benchmarking tool, when using the concurrency parameter (-c) to a value still sustainable, What did you observe in the results of the Benchmark, were there errors, or failed request? (just a brief interpretation)*

We ran the benchmark making 100 000 requests, with different concurrency levels (2, 3, 5, 10, 15, 25, 50 and 100). None of the benchmarks had failed requests or produced errors, but we could notice that the time per request increased with the concurrency level, as we can see in the following table:

Concurrency level	2	3	5	10	15	25	50	100
Time per request	3.152	4.376	6.743	11.352	13.332	21.354	41.815	86.141