

HowTo ASIX Ansible

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Ansible Instal·lació i configuració d'un lab

- Ansible Documentation
<https://docs.ansible.com/ansible/latest/index.html>

Descripció general

Eina per realitzar configuracions / desplegaments automatitzats a conjunts de hosts.

Ansible concepts:

https://docs.ansible.com/ansible/latest/getting_started/basic_concepts.html

Característiques principals:

- Agentless.
- Control node i managed nodes.
- Usa SSH per comunicar amb els hosts. Ha de disposar d'accés via SSH als hosts, per tant cal un usuari d'accés. Preferentment l'accés és via *ssh public key*.
- Inventory: conjunts de hosts amb agrupacions.

Ansible concepts:

Control node

The machine from which you run the Ansible CLI tools (`ansible-playbook`, `ansible`, `ansible-vault` and others). You can use any computer that meets the software requirements as a control node - laptops, shared desktops, and servers can all run Ansible. Multiple control nodes are possible, but Ansible itself does not coordinate across them, see AAP for such features.

Managed nodes

Also referred to as 'hosts', these are the target devices (servers, network appliances or any computer) you aim to manage with Ansible. Ansible is not normally installed on managed nodes, unless you are using `ansible-pull`, but this is rare and not the recommended setup.

Inventory

A list of managed nodes provided by one or more 'inventory sources'. Your inventory can specify information specific to each node, like IP address. It is also used for assigning groups, that both allow for node selection in the Play and bulk variable assignment. To learn more about inventory, see the Working with Inventory section. Sometimes an inventory source file is also referred to as a 'hostfile'.

Playbooks

They contain Plays (which are the basic unit of Ansible execution). This is both an 'execution concept' and how we describe the files on which `ansible-playbook` operates. Playbooks are written in YAML and are easy to read, write, share and understand. To learn more about playbooks, see Ansible playbooks.

Plays

The main context for Ansible execution, this playbook object maps managed nodes (hosts) to tasks. The Play contains variables, roles and an ordered lists of

tasks and can be run repeatedly. It basically consists of an implicit loop over the mapped hosts and tasks and defines how to iterate over them.

Roles

A limited distribution of reusable Ansible content (tasks, handlers, variables, plugins, templates and files) for use inside of a Play. To use any Role resource, the Role itself must be imported into the Play.

Tasks

The definition of an 'action' to be applied to the managed host. Tasks must always be contained in a Play, directly or indirectly (Role, or imported/included task list file). You can execute a single task once with an ad hoc command using `ansible` or `ansible-console` (both create a virtual Play).

Handlers

A special form of a Task, that only executes when notified by a previous task which resulted in a 'changed' status.

Modules

The code or binaries that Ansible copies to and executes on each managed node (when needed) to accomplish the action defined in each Task. Each module has a particular use, from administering users on a specific type of database to managing VLAN interfaces on a specific type of network device. You can invoke a single module with a task, or invoke several different modules in a playbook. Ansible modules are grouped in collections. For an idea of how many collections Ansible includes, see the Collection Index.

Plugins

Pieces of code that expand Ansible's core capabilities, they can control how you connect to a managed node (connection plugins), manipulate data (filter plugins) and even control what is displayed in the console (callback plugins). See Working with plugins for details.

Collections

A format in which Ansible content is distributed that can contain playbooks, roles, modules, and plugins. You can install and use collections through Ansible Galaxy. To learn more about collections, see Using Ansible collections. Collection resources can be used independently and discretely from each other.

AAP

Short for 'Ansible Automation Platform'. This is a product that includes enterprise level features and integrates many tools of the Ansible ecosystem: `ansible-core`, `awx`, `galaxyNG`, and so on.

Installation Ansible

- Ansible Installation Guide

https://docs.ansible.com/ansible/latest/installation_guide/index.html

Installing on Debian 11 Bullseye

```
$ sudo vim /etc/apt/sources.list.d/ansible.list
deb http://ppa.launchpad.net/ansible/ansible/ubuntu focal main

$ sudo apt-key adv --keyserver keyserver.ubuntu.com --recv-keys
93C4A3FD7BB9C367

$ sudo apt-get update
$ sudo apt-get install ansible
```

```
$ ansible --version
ansible 2.9.21
```

```
config file = /etc/ansible/ansible.cfg
configured module search path = ['/home/ecanet/.ansible/plugins/modules',
'/usr/share/ansible/plugins/modules']
ansible python module location = /usr/lib/python3.8/site-packages/ansible
executable location = /usr/bin/ansible
python version = 3.8.10 (default, May 4 2021, 00:00:00) [GCC 10.2.1 20201125
(Red Hat 10.2.1-9)]
```

Test d'ansible al propi host per verificar inventory

- El host local ha de tenir actiu el servei ssh.
- L'usuari actual ha de poder connectar al host local via ssh.
- Ansible Getting Started:
https://docs.ansible.com/ansible/latest/getting_started/index.html

Exemple defineix un inventory amb tres adreces IP del propi host corresponents al localhost, la ip pública i la de docker (si està instal·lat).

Exemple amb un inventory amb format **YAML**

```
$ cat localhost.yaml
myself:
  hosts:
    myloopback:
      ansible_host: 127.0.0.1
    mypublicip:
      ansible_host: 192.168.1.111
    mypublicdocker:
      ansible_host: 172.17.0.1

$ ansible all --list-hosts -i localhost.yaml
hosts (3):
  myloopback
  mypublicip
  mypublicdocker
```

Exemple amb un inventory en format **INI**

```
$ cat localhost.ini
[myself]
127.0.0.1
192.168.1.111
172.17.0.1

$ ansible all --list-hosts -i localhost.ini
hosts (3):
  127.0.0.1
  192.168.1.111
  172.17.0.1
```

Test al propi host per verificar ping dels managed nodes

Amb aquest exemple es verificarà que s'identifiquen correctament les adreces IP de l'inventari i que es disposa d'un usuari i accés SSH als managed nodes (als hosts on actuar).

Verificar que el servei ssh està activat. Per anar bé cal que el servei SSH ja disposi del fingerprint dels hosts destí en el `known_hosts`. Si no s'hi ha accedir mai podem fer-ho abans amb l'ordre:

```
$ sudo systemctl status sshd

$ ssh-keyscan 127.0.0.1 192.168.1.111 172.17.0.1
```

Realitzar un ping als hosts de l'inventari. S'utilitzen les opcions:

- m *ping* per indicar que ansible utilitzi el mòdul ping.
- k per indicar que ha de demanar el passwd de ssh interactivament (no és el que es pretendrà usualment, sinó fer-ho per pubkey).
- i *inventory* per indicar el fitxer amb l'inventari dels managed hosts

Observem que s'ha connectat correctament al host local per la interfície pública i pel loopback però no per la de docker.

```
$ ansible all -m ping -k -i localhost.yaml
SSH password: <password-de-l'usuari>

mypublicdocker | FAILED! => {
  "msg": "Using a SSH password instead of a key is not possible because Host
Key checking is enabled and sshpass does not support this. Please add this
host's fingerprint to your known_hosts file to manage this host."
}

myloopback | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}

mypublicip | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python"
  },
  "changed": false,
  "ping": "pong"
}
```

Llistat de l'inventoy

```
$ ansible-inventory -i localhost.yaml --list
{
  "_meta": {
    "hostvars": {
      "myloopback": {
        "ansible_host": "127.0.0.1"
      },
      "mypublicdocker": {
        "ansible_host": "172.17.0.1"
      },
      "mypublicip": {
        "ansible_host": "192.168.1.111"
      }
    }
  },
  "all": {
    "children": [
      "myself",
      "ungrouped"
    ]
  },
  "myself": {
    "hosts": [
      "myloopback",

```

```
        "mypublicdocker",
        "mypublicip"
    ]
}
```

```
$ ansible-inventory -i localhost.ini --list
{
  "_meta": {
    "hostvars": {}
  },
  "all": {
    "children": [
      "myself",
      "ungrouped"
    ]
  },
  "myself": {
    "hosts": [
      "127.0.0.1",
      "172.17.0.1",
      "192.168.1.111"
    ]
  }
}
```

Desplegar un lab per fer pràctiques

Procediment:

- Crear el directori de treball.
- Generar la parella de claus pública/privada de SSH.
- Generar el lab amb màquines virtuals desplegades amb Vagrant.
 - Crear un usuari ansible a cada màquina.
 - Posar la clau pública generada al pas-2 al *authorized_keys*.
- Verificar l'accés a les VM tant via *vagrant ssh* com fent ssh amb l'usuari ansible.

Generar una parella de claus SSH

Primerament es generarà una parella de claus SSH (una clau pública i una de privada) usant *ssh-keygen*. En la ruta indicar que els fitxers estiguin en el directori actiu i amb el nom *ansible* per identificar que són les que s'utilitzaran en aquest lab. Aquestes claus es creen sense passphrase (de moment...)

```
$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ecanet/.ssh/id_rsa): ansible_key
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in ansible_key
Your public key has been saved in ansible_key.pub
The key fingerprint is:
SHA256:/AvumLX0RVNHrfRRf4BndIih7YpnnSFyykZTVR/Jw8s ecanet@mylaptop.edt.org

$ ls -l
-rw-----. 1 ecanet ecanet 2610 Feb 14 17:28 ansible_key
-rw-r--r--. 1 ecanet ecanet  577 Feb 14 17:28 ansible_key.pub
-rw-rw-r--. 1 ecanet ecanet   45 Feb 14 17:05 localhost.ini
-rw-rw-r--. 1 ecanet ecanet  164 Feb 14 17:03 localhost.yaml
-rw-rw-r--. 1 ecanet ecanet  844 Feb 14 17:26 Vagrantfile
```

Generar les màquines virtuals amb Vagrantfile

Usar un fitxer de desplegament Vagrantfile com el següent, que crea un servidor tres workers Debian 11.

```
# -*- mode: ruby -*-
# vi: set ft=ruby :

Vagrant.configure("2") do |config|
  config.vm.synced_folder ".", "/vagrant"

  config.vm.provider "virtualbox" do |vb|
    vb.memory = 4096
    vb.cpus = 2
  end

  config.vm.define "server" do |srv|
    srv.vm.box = "debian/bullseye64"
    srv.vm.network "public_network", bridge: "enp1s0"
    srv.vm.provision "shell", inline: $install_ssh_pubkey_script_debian
  end

  (1..3).each do |i|
    config.vm.define "worker#{i}" do |wk|
      wk.vm.box = "generic/alpine38"
      wk.vm.box = "debian/bullseye64"
      wk.vm.network "public_network", bridge: "enp1s0"
      wk.vm.provision "shell", inline: $install_ssh_pubkey_script_debian
    end
  end
end

$install_ssh_pubkey_script_debian = <<SCRIPT
sudo useradd -m -s /bin/bash ansible
sudo mkdir /home/ansible/.ssh
sudo cp /vagrant/ansible_key.pub /home/ansible/.ssh/authorized_keys
sudo chown -R ansible.ansible /home/ansible/.ssh/
SCRIPT
```

Recordeu que vagrant ja crea un usuari dins de les VM i crea també una parella de claus pública/privada (insegura) per accedir via ssh. A més a més propaga el port 22 de la VM al port 2222 del host amfitrió.

```
==> server: Forwarding ports...
server: 22 (guest) => 2222 (host) (adapter 1)
```

```
vagrant@bullseye:~$ ls -la .ssh/
-rw----- 1 vagrant vagrant 389 Feb 14 16:59 authorized_keys

vagrant@bullseye:~$ cat .ssh/authorized_keys
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQCPj3j8+eQ7FsZAe9z8dlv7Vi3npxtRg/szLwSKExPmKUXaggoTR
2a4e62rYadkdmHBYEofkA7PSgtmWbStK5zWH/jwYtZp3hrRgK+ePuRXPzLzmKCGhmlIP/YR+5CtmmSZcB
LOpOlGeeVBXRr5YpDJK6pMvGms93W9Jdacw/PYkPbt62V8rDb5obcbwgGGmBvCJiMX1Mlf8UMe+f1MFkI
bKvCyt5Un3Yo9dl6QQ0F+ddact3aQzd4gEJRYUio7goKwJ2sOGRRCmPEiqXc5SdwLQMB3l/H5IpYajZxd
jFWXm2RsVovShW/YIXHfiINTwl2edHH65QrbWeewJ1lktrod vagrant

vagrant@bullseye:~$ nmap localhost
Starting Nmap 7.80 ( https://nmap.org ) at 2023-02-14 17:04 UTC
Nmap scan report for localhost (127.0.0.1)
Host is up (0.000070s latency).
Other addresses for localhost (not scanned): ::1
Not shown: 999 closed ports
PORT      STATE SERVICE
22/tcp    open  ssh
```

Crear l'usuari ansible i posar la clau pública al `authorized_keys`

Per poder accedir amb ansible a cada VM es requereix un usuari que permeti l'accés a la màquina via SSH preferentment amb accés per clau pública. En aquest lab es crea a cada màquina un usuari ansible i es posa la clau pública (generada al pas 2) dins del fitxer `authorized_keys` de l'usuari ansible.

Observem la part de codi a modificar/afegir al `vagrantfile`:

```
config.vm.define "server" do |srv|
  ...
  srv.vm.provision "file", source: "../ansible_key.pub", \
    destination: "../.ssh/authorized_keys"
end

$install_ssh_pubkey_script_debian = <<SCRIPT
sudo useradd -m -s /bin/bash ansible
sudo mkdir /home/ansible/.ssh
sudo cp /vagrant/ansible_key.pub /home/ansible/.ssh/authorized_keys
sudo chown -R ansible:ansible /home/ansible/.ssh/
SCRIPT
```

Verificar l'accés amb l'usuari vagrant i amb l'usuari ansible

Podem verificar que un cop iniciada la màquina server s'hi pot accedir normalment amb vagrant:

```
$ vagrant up

$ vagrant ssh server
Linux bullseye 5.10.0-20-amd64 #1 SMP Debian 5.10.158-2 (2022-12-13) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

vagrant@bullseye:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:8d:c0:4d brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic eth0
        valid_lft 86353sec preferred_lft 86353sec
    inet6 fe80::a00:27ff:fe8d:c04d/64 scope link
        valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
group default qlen 1000
    link/ether 08:00:27:ce:9a:05 brd ff:ff:ff:ff:ff:ff
    altname enp0s8
    inet 192.168.1.39/24 brd 192.168.1.255 scope global dynamic eth1
        valid_lft 43160sec preferred_lft 43160sec
    inet6 fe80::a00:27ff:fece:9a05/64 scope link
        valid_lft forever preferred_lft forever
```

I també que es pot accedir amb l'usuari ansible


```
$ ssh -i ansible_key -p 2222 ansible@localhost
The authenticity of host '[localhost]:2222 ([127.0.0.1]:2222)' can't be
established.
ECDSA key fingerprint is SHA256:OZBI7P++lnBkHD8lnxb6LTYq6uL35eOUOvs2/EEYPac.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '[localhost]:2222' (ECDSA) to the list of known hosts.
Linux bullseye 5.10.0-20-amd64 #1 SMP Debian 5.10.158-2 (2022-12-13) x86_64

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permitted by applicable law.

ansible@bullseye:~$ id
uid=1001(ansible) gid=1001(ansible) groups=1001(ansible)
```

```
$ ssh -i ansible_key -p 22 ansible@192.168.1.39
The authenticity of host '192.168.1.39 (192.168.1.39)' can't be established.
ECDSA key fingerprint is SHA256:OZBI7P++lnBkHD8lnxb6LTYq6uL35eOUOvs2/EEYPac.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.1.39' (ECDSA) to the list of known hosts.
Linux bullseye 5.10.0-20-amd64 #1 SMP Debian 5.10.158-2 (2022-12-13) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Feb 14 17:29:39 2023 from 10.0.2.2
ansible@bullseye:~$
```

```
$ vagrant status
Current machine states:
server                running (virtualbox)
worker1               running (virtualbox)
worker2               running (virtualbox)
worker3               running (virtualbox)
This environment represents multiple VMs. The VMs are all listed
above with their current state. For more information about a specific
VM, run `vagrant status NAME`.
```

****nota**** convé tenir el fingerprint dels hosts destí al known_hosts, es pot fer per exemple amb:

```
$ ssh-keyscan <ip> <ip> <ip> <ip> >> ~/.ssh/known_hosts
```

Probar ansible al lab de vagrant

Primerament caldrà desplegar el lab. Atenció: el lab desplegat usa adreces públiques del bridge, per tant primer caldrà identificar les adreces IP dels hosts virtuals.

Procediment:

- Desplegar el lab amb vagrant.
- Identificar les adreces IP de les màquines virtuals.

- Generar l'inventari amb aquestes adreces.
- Aplicar amb vagrant un mòdul, per exemple el mòdul ping.

Desplegar el lab, iniciar sessions i anotar adreces ip

```
$ vagrant up

$ vagrant ssh server
vagrant@bullseye:~$ ip a

$ vagrant ssh worker1
$ vagrant ssh worker2
$ vagrant ssh worker3
```

Crear l'inventari:

```
$ cat inventory_lab_public.yaml
servernet:
  hosts:
    server:
      ansible_host: 192.168.1.55

workersnet:
  hosts:
    worker1:
      ansible_host: 192.168.1.46
    worker2:
      ansible_host: 192.168.1.47
    worker3:
      ansible_host: 192.168.1.50

vagrantlabpublic:
  children:
    servernet:
    workersnet:
```

```
$ ansible-inventory -i inventory_lab_public.yaml --list
{
  "_meta": {
    "hostvars": {
      "server": {
        "ansible_host": "192.168.1.55"
      },
      "worker1": {
        "ansible_host": "192.168.1.46"
      },
      "worker2": {
        "ansible_host": "192.168.1.47"
      },
      "worker3": {
        "ansible_host": "192.168.1.50"
      }
    }
  }
}
...
```

Problema: per accedir als managed hosts amb ansible hem creat dins d'ells un usuari ansible i disposem de la clau privada que en permet l'accés, però cal poder-li indicar l'usuari que es vol usar (si no utilitza l'usuari de la sessió actual) i on està el fitxer de clau privada.

Observem que amb l'usuari actual no funciona i demana el password ssh:

```
$ ansible servernet -m ping -k -i inventory_lab_public.yaml
```

```
SSH password: [ERROR]: User interrupted execution
```

Podem consultar la Ansible cheatsheet

- https://docs.ansible.com/ansible/latest/command_guide/cheatsheet.html
- <https://docs.ansible.com/ansible/latest/cli/ansible.html>

En l'exemple s'egüent s'utilitzen les següents opcions:

servernet (no és una opció) argument que indica els managed hosts a usar.
-u ansible per indicar que l'usuari destí és l'usuari ansible
--private-key ./ansible_key clau provada a usar en la connexió ssh
-i inventory_lab_public.yaml inventory de hosts
-m ping mòdul directe a utilitzar

```
$ ansible servernet -u ansible --private-key ./ansible_key \
-i inventory_lab_public.yaml -m ping
server | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

En l'exemple anterior s'ha fer ping als managed hosts de la xarxa *servernet*. Anem a provar ara als de la xarxa *workersnet*.

```
$ ansible workersnet -u ansible --private-key ./ansible_key \
-i inventory_lab_public.yaml -m ping
worker3 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
worker1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
worker2 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

I si provem tots els hosts definitions a l'inventory obtenim:

```
$ ansible all -u ansible --private-key ./ansible_key -i inventory_lab_public.yaml
-m ping
worker3 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
worker2 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
server | SUCCESS => {
```

```

"ansible_facts": {
  "discovered_interpreter_python": "/usr/bin/python3"
},
"changed": false,
"ping": "pong"
}

worker1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}

```

Usar un lab amb xarxa privada

Implementa un servidor i tres workers tots ells Debian 11 en la xarxa privada 172.30.30.0/24.

Vagrantfile

```

# -*- mode: ruby -*-
# vi: set ft=ruby :

Vagrant.configure("2") do |config|
  config.vm.synced_folder ".", "/vagrant"

  config.vm.provider "virtualbox" do |vb|
    vb.memory = 4096
    vb.cpus = 2
  end

  config.vm.define "server" do |srv|
    srv.vm.box = "debian/bullseye64"
    srv.vm.network "private_network", ip: "172.30.30.10"
    srv.vm.provision "shell", inline: $install_ssh_pubkey_script_debian
  end

  (1..3).each do |i|
    config.vm.define "worker#{i}" do |wk|
      #wk.vm.box = "generic/alpine38"
      wk.vm.box = "debian/bullseye64"
      wk.vm.network "private_network", ip: "172.30.30.#{i+10}"
      wk.vm.provision "shell", inline: $install_ssh_pubkey_script_debian
    end
  end

  $install_ssh_pubkey_script_debian = <<SCRIPT
sudo useradd -m -s /bin/bash ansible
sudo mkdir /home/ansible/.ssh
sudo cp /vagrant/ansible_key.pub /home/ansible/.ssh/authorized_keys
sudo chown -R ansible.ansible /home/ansible/.ssh/
SCRIPT

```

```

$ cat inventory_lab_private.yaml
servernet:
  hosts:
    server:
      ansible_host: 172.30.30.10

workersnet:
  hosts:
    worker1:
      ansible_host: 172.30.30.11
    worker2:

```

```

    ansible_host: 172.30.30.12
worker3:
    ansible_host: 172.30.30.13

vagrantlabpublic:
  children:
    servernet:
    workersnet:

```

```

$ ansible-inventory -i inventory_lab_private.yaml --list
{
  "_meta": {
    "hostvars": {
      "server": {
        "ansible_host": "172.30.30.10"
      },
      "worker1": {
        "ansible_host": "172.30.30.11"
      },
      "worker2": {
        "ansible_host": "172.30.30.12"
      },
      "worker3": {
        "ansible_host": "172.30.30.13"
      }
    }
  }
}
...

```

```

$ ssh-keyscan 172.30.30.10 172.30.30.11 172.30.30.12 172.30.30.13 >>
~/.ssh/known_hosts

```

```

$ ansible-playbook -u ansible --private-key ./ansible_key \
  -i inventory_lab_private.yaml playbook_exemple_01_ping.yaml

PLAY [My first play]
*****
*****

TASK [Gathering Facts]
*****
*****
ok: [worker1]
ok: [worker2]
ok: [worker3]

TASK [Ping my hosts]
*****
*****
ok: [worker3]
ok: [worker1]
ok: [worker2]

TASK [Print message]
*****
*****
ok: [worker1] => {
  "msg": "Hello world"
}
ok: [worker2] => {
  "msg": "Hello world"
}
ok: [worker3] => {
  "msg": "Hello world"
}

PLAY RECAP
*****
*****

```

worker1		: ok=3	changed=0	unreachable=0	failed=0
skipped=0	rescued=0	ignored=0			
worker2		: ok=3	changed=0	unreachable=0	failed=0
skipped=0	rescued=0	ignored=0			
worker3		: ok=3	changed=0	unreachable=0	failed=0
skipped=0	rescued=0	ignored=0			

Playbook:

```
- name: My first play
  hosts: workersnet
  tasks:
    - name: Ping my hosts
      ansible.builtin.ping:
    - name: Print message
      ansible.builtin.debug:
        msg: Hello world
```

Playbooks

- Getting Started: Creating a playbook
https://docs.ansible.com/ansible/latest/getting_started/get_started_playbook.html
- Using Ansible playbooks
https://docs.ansible.com/ansible/latest/playbook_guide/index.html
- CLI ansible-playbook cheatsheet
<https://docs.ansible.com/ansible/latest/cli/ansible-playbook.html>

Conceptes:

<p>Playbook A list of plays that define the order in which Ansible performs operations, from top to bottom, to achieve an overall goal.</p> <p>Play An ordered list of tasks that maps to managed nodes in an inventory.</p> <p>Task A list of one or more modules that defines the operations that Ansible performs.</p> <p>Module A unit of code or binary that Ansible runs on managed nodes. Ansible modules are grouped in collections with a Fully Qualified Collection Name (FQCN) for each module.</p>
--

Exemples d'ordres:

- `ansible-playbook -u ansible --private-key ./ansible_key -i inventory_lab_public.yaml playbook_exemple_01_ping.yaml`
- `ansible-playbook -C sampleplaybook.yml -i ansible_hosts`
- `ansible-playbook --syntax-check sampleplaybook.yml -i ansible_hosts`

Exemple-1 Playbook: fer ping als managed hosts

En aquest exemple es genera un playbook molt senzill per fer ping als managed hosts.

<pre>\$ cat playbook_exemple_01_ping.yaml - name: My first play hosts: workersnet tasks: - name: Ping my hosts ansible.builtin.ping: - name: Print message ansible.builtin.debug: msg: Hello world</pre>
--

```

$ ansible-playbook -u ansible --private-key ./ansible_key \
                  -i inventory_lab_public.yaml playbook_exemple_01_ping.yaml

PLAY [My first play]
*****

TASK [Gathering Facts]
*****
ok: [worker3]
ok: [worker2]
ok: [worker1]

TASK [Ping my hosts]
*****
ok: [worker2]
ok: [worker1]
ok: [worker3]

TASK [Print message]
*****
ok: [worker1] => {
  "msg": "Hello world"
}
ok: [worker2] => {
  "msg": "Hello world"
}
ok: [worker3] => {
  "msg": "Hello world"
}

PLAY RECAP
*****
worker1      : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0
worker2      : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0
worker3      : ok=3    changed=0    unreachable=0    failed=0    skipped=0    rescued=0
ignored=0

```

Exemple-2 Playbook: update web servers

```

---
- name: Update web servers
  hosts: webservers
  remote_user: root

  tasks:
    - name: Ensure apache is at the latest version
      ansible.builtin.yum:
        name: httpd
        state: latest
    - name: Write the apache config file
      ansible.builtin.template:
        src: /srv/httpd.j2
        dest: /etc/httpd.conf

- name: Update db servers
  hosts: databases
  remote_user: root

  tasks:
    - name: Ensure postgresql is at the latest version
      ansible.builtin.yum:
        name: postgresql
        state: latest
    - name: Ensure that postgresql is started
      ansible.builtin.service:
        name: postgresql
        state: started

```


Ansible builtin

- Ansible builtin

<https://docs.ansible.com/ansible/latest/collections/ansible/builtin/index.html>

```
# Modules
• add\_host module – Add a host (and alternatively a group) to the ansible-playbook in-memory inventory
• apt module – Manages apt-packages
• apt\_key module – Add or remove an apt key
• apt\_repository module – Add and remove APT repositories
• assemble module – Assemble configuration files from fragments
• assert module – Asserts given expressions are true
• async\_status module – Obtain status of asynchronous task
• blockinfile module – Insert/update/remove a text block surrounded by marker lines
• command module – Execute commands on targets
• copy module – Copy files to remote locations
• cron module – Manage cron.d and crontab entries
• debconf module – Configure a .deb package
• debug module – Print statements during execution
• dnf module – Manages packages with the dnf package manager
• dpkg\_selections module – Dpkg package selection selections
• expect module – Executes a command and responds to prompts
• fail module – Fail with custom message
• fetch module – Fetch files from remote nodes
• file module – Manage files and file properties
• find module – Return a list of files based on specific criteria
• gather\_facts module – Gathers facts about remote hosts
• get\_url module – Downloads files from HTTP, HTTPS, or FTP to node
• getent module – A wrapper to the unix getent utility
• git module – Deploy software (or files) from git checkouts
• group module – Add or remove groups
• group\_by module – Create Ansible groups based on facts
• hostname module – Manage hostname
• import\_playbook module – Import a playbook
• import\_role module – Import a role into a play
• import\_tasks module – Import a task list
```

- `include module` – Include a task list
- `include_role module` – Load and execute a role
- `include_tasks module` – Dynamically include a task list
- `include_vars module` – Load variables from files, dynamically within a task
- `iptables module` – Modify iptables rules
- `known_hosts module` – Add or remove a host from the `known_hosts` file
- `lineinfile module` – Manage lines in text files
- `meta module` – Execute Ansible 'actions'
- `package module` – Generic OS package manager
- `package_facts module` – Package information as facts
- `pause module` – Pause playbook execution
- `ping module` – Try to connect to host, verify a usable python and return `pong` on success
- `pip module` – Manages Python library dependencies
- `raw module` – Executes a low-down and dirty command
- `reboot module` – Reboot a machine
- `replace module` – Replace all instances of a particular string in a file using a back-referenced regular expression
- `rpm_key module` – Adds or removes a gpg key from the rpm db
- `script module` – Runs a local script on a remote node after transferring it
- `service module` – Manage services
- `service_facts module` – Return service state information as fact data
- `set_fact module` – Set host variable(s) and fact(s).
- `set_stats module` – Define and display stats for the current ansible run
- `setup module` – Gathers facts about remote hosts
- `shell module` – Execute shell commands on targets
- `slurp module` – Slurps a file from remote nodes
- `stat module` – Retrieve file or file system status
- `subversion module` – Deploys a subversion repository
- `systemd module` – Manage systemd units
- `systemd_service module` – Manage systemd units
- `sysvinit module` – Manage SysV services.
- `tempfile module` – Creates temporary files and directories
- `template module` – Template a file out to a target host
- `unarchive module` – Unpacks an archive after (optionally) copying it from the local machine
- `uri module` – Interacts with webservices
- `user module` – Manage user accounts
- `validate_argument_spec module` – Validate role argument specs.
- `wait_for module` – Waits for a condition before continuing
- `wait_for_connection module` – Waits until remote system is reachable/usable
- `yum module` – Manages packages with the `yum` package manager
- `yum_repository module` – Add or remove YUM repositories

Collections

- <https://docs.ansible.com/ansible/latest/collections/index.html>

```
#Collections
```

- [amazon.aws](#)
- [ansible.builtin](#)
- [ansible.netcommon](#)
- [ansible.posix](#)
- [ansible.utils](#)
- [ansible.windows](#)
- [arista.eos](#)
- [awx.awx](#)
- [azure.azurecollection](#)
- [check_point.mgmt](#)
- [chocolatey.chocolatey](#)
- [cisco.aci](#)
- [cisco.asa](#)
- [cisco.dnac](#)
- [cisco.intersight](#)
- [Cisco.ios](#)
- ...

Using variables

- Using variables
https://docs.ansible.com/ansible/latest/playbook_guide/playbooks_variables.html

Exemples Ansible documentation

```

---
- name: Update web servers
  hosts: webservers
  remote_user: root

  tasks:
    - name: Ensure apache is at the latest version
      ansible.builtin.yum:
        name: httpd
        state: latest
    - name: Write the apache config file
      ansible.builtin.template:
        src: /srv/httpd.j2
        dest: /etc/httpd.conf

- name: Update db servers
  hosts: databases
  remote_user: root

  tasks:
    - name: Ensure postgresql is at the latest version
      ansible.builtin.yum:
        name: postgresql
        state: latest
    - name: Ensure that postgresql is started

```

```
ansible.builtin.service:
  name: postgresql
  state: started
```

Exemples generals (altres exemples)

<https://spacelift.io/blog/ansible-tutorial>

```
---
- name: Intro to Ansible Playbooks
  hosts: all

  tasks:
    - name: Copy file hosts with permissions
      ansible.builtin.copy:
        src: ./hosts
        dest: /tmp/hosts_backup
        mode: '0644'
    - name: Add the user 'bob'
      ansible.builtin.user:
        name: bob
        become: yes
        become_method: sudo
    - name: Upgrade all apt packages
      apt:
        force_apt_get: yes
        upgrade: dist
        become: yes
```

<https://spacelift.io/blog/ansible-tutorial>

```
---
- name: Variables playbook
  hosts: all
  vars:
    state: latest
    user: bob
  tasks:
    - name: Add the user {{ user }}
      ansible.builtin.user:
        name: "{{ user }}"
    - name: Upgrade all apt packages
      apt:
        force_apt_get: yes
        upgrade: dist
    - name: Install the {{ state }} of package "nginx"
      apt:
        name: "nginx"
        state: "{{ state }}"
```

<https://www.middlewareinventory.com/blog/ansible-playbook-example/>

```
---
- name: Playbook
  hosts: webservers
  become: yes
  become_user: root
  tasks:
    - name: ensure apache is at the latest version
      yum:
        name: httpd
        state: latest
    - name: ensure apache is running
      service:
        name: httpd
        state: started
```

<https://www.middlewareinventory.com/blog/ansible-playbook-example/>

```
---
# Play1 - WebServer related tasks
- name: Play Web - Create apache directories and username in web servers
  hosts: webservers
  become: yes
  become_user: root
  tasks:
    - name: create username apacheadm
      user:
        name: apacheadm
        group: users,admin
        shell: /bin/bash
        home: /home/weblogic

    - name: install httpd
      yum:
        name: httpd
        state: installed

# Play2 - Application Server related tasks
- name: Play app - Create tomcat directories and username in app servers
  hosts: appservers
  become: yes
  become_user: root
  tasks:
    - name: Create a username for tomcat
      user:
        name: tomcatadm
        group: users
        shell: /bin/bash
        home: /home/tomcat

    - name: create a directory for apache tomcat
      file:
        path: /opt/oracle
        owner: tomcatadm
        group: users
        state: present
        mode: 0755
```

<https://www.middlewareinventory.com/blog/ansible-playbook-example/>

Usar variables

```
---
- name: Playbook
  hosts: webservers
  become: yes
  become_user: root
  vars:
    key_file: /etc/apache2/ssl/mywebsite.key
    cert_file: /etc/apache2/ssl/mywebsite.cert
    server_name: www.mywebsite.com
  tasks:
    - name: ensure apache is at the latest version
      yum:
        name: httpd
        state: latest
    ### SOME MORE TASKS WOULD COME HERE ###
    # you can refer the variable you have defined earlier like this #
    # "{{key_file}}" (or) "{{cert_file}}" (or) "{{server_name}}" #
    ##
    - name: ensure apache is running
      service:
        name: httpd
        state: started
```

<https://www.middlewareinventory.com/blog/ansible-playbook-example/>

Usar variables en fitxers

```

---
- name: Playbook
  hosts: webservers
  become: yes
  become_user: root
  vars_files:
    - apacheconf.yml
  tasks:
    - name: ensure apache is at the latest version
      yum:
        name: httpd
        state: latest
      ### SOME MORE TASKS WOULD COME HERE ###
      # you can refer the variable you have defined earlier like this #
      # "{{key_file}}" (or) "{{cert_file}}" (or) "{{server_name}}" #
      ##
    - name: ensure apache is running
      service:
        name: httpd
        state: started

key_file: /etc/apache2/ssl/mywebsite.key
cert_file: /etc/apache2/ssl/mywebsite.cert
server_name: www.mywebsite.com

```

<https://www.middlewareinventory.com/blog/ansible-playbook-example/>

Example Ansible Playbook to Setup LAMP stack

```

---
- name: Setting up LAMP Website
  user: vagrant
  hosts: testserver
  become: yes
  tasks:
    - name: latest version of all required packages installed
      yum:
        name:
          - firewalld
          - httpd
          - mariadb-server
          - php
          - php-mysql
        state: latest

    - name: firewalld enabled and running
      service:
        name: firewalld
        enabled: true
        state: started

    - name: firewalld permits http service
      firewalld:
        service: http
        permanent: true
        state: enabled
        immediate: yes

    - name: Copy mime.types file
      copy:
        src: /etc/mime.types
        dest: /etc/httpd/conf/mime.types
        remote_src: yes

    - name: httpd enabled and running
      service:
        name: httpd
        enabled: true
        state: started

    - name: mariadb enabled and running
      service:
        name: mariadb
        enabled: true

```

```

state: started

- name: copy the php page from remote using get_url
  get_url:
    url: "https://www.middlewareinventory.com/index.php"
    dest: /var/www/html/index.php
    mode: 0644

- name: test the webpage/website we have setup
  uri:
    url: http://{{ansible_hostname}}/index.php
    status_code: 200

```

<https://www.middlewareinventory.com/blog/ansible-playbook-example/>

Exemples:

1. [Archive module examples – Ansible](#)
2. [Ansible Unarchive module examples](#)
3. [Shell module examples](#)
4. [Ansible Copy module examples](#)
5. [Ansible + Vagrant Playbook for provisioning Apache](#)
6. [Ansible Copy SSH Keys between remote servers example](#)
7. [How to copy files between remote hosts with ansible](#)
8. [Ansible changed_when and failed_when in playbook](#)
9. [Ansible Command Module Playbook examples](#)
10. [How to use GIT with Ansible playbook](#)
11. [Template module examples – Ansible](#)
12. [Lookup module examples – Ansible](#)
13. [How to read and process JSON file with ansible example](#)
14. [Ansible apt module examples](#)
15. [Ansible Find module examples](#)
16. [How to Process JSON Data with JSON_Query ansible](#)
17. [Ansible AWS EC2 Example playbook](#)
18. [Ansible async Poll examples](#)
19. [How to download file from URL with ansible playbook](#)
20. [Ansible lineinfile – How to add, replace, update line in file with ansible](#)
21. [Ansible replace module – how to replace texts in ansible](#)
22. [How to wait_for task to be completed in playbook example](#)
23. [Add users to EC2 instances with SSH Access – Ansible automated](#)
24. [Weblogic JMS Queue Creation with Ansible and WLST](#)
25. [Ansible inventory_hostname and ansible_hostname example playbook](#)
26. [Ansible FirewallD Example Playbook](#)
27. [Ansible How to connect using Bastion host](#)
28. [Ansible Playbook to find EC2 instances using EFS file system](#)
29. [Ansible Playbook to Delete OLD log files in Windows – Ansible Windows](#)
30. [Playbook to Find and Replace Default HTML in IIS – Ansible Windows](#)
31. [Ansible Windows Example – How to use Ansible with Windows](#)
32. [Ansible Select Attr Example – How to Filter Dictionary and Select Items](#)
33. [Ansible Map Function Examples – How to Filter List and Dictionaries](#)
34. [Ansible Split Function Examples – With String, List and Dictionary](#)
35. [Ansible S3 module Examples – How to use ansible aws_s3 module](#)
36. [Ansible Copy files Local to Remote](#)
37. [Ansible PRE tasks and POST Tasks Introduction and Examples](#)
38. [Ansible List Examples – How to create and append items to list](#)
39. [Ansible playbook to install KAFKA On Ubuntu](#)
40. [Ansible Slack example – How to send Slack notifications from Ansible](#)
41. [Ansible Retry example – How to retry an ansible task until the Condition is met](#)
42. [Find multiple files with patterns and replace them with Ansible](#)
43. [Playbook to install Apache Tomcat](#)
44. [How to wait for URL to respond with Ansible URI – Web and API automation](#)
45. [Ansible URI module examples – for Web and API automation](#)

```
- name: Ensure docker is at the latest version
  ansible.builtin.apt:
    name: docker
    state: latest
- name: Ensure that docker is started
  ansible.builtin.service:
    name: docker
    state: started
```

Pratiques

Pràctica Aula

Documentació:

- ☐ <https://gitlab.com/manelmellado/ubnt-at-inf>
- ☐ <https://gitlab.com/edtasixm14/m14-projectes>

Implementar un playbook que aplicat a un host de l'aula o a una màquina virtual Vagrant amb xarxa bridge realitzi tota la post instal·lació necessària per configurar-lo com un host de l'aula del domini de l'escola, amb autenticació d'usuaris LDAP.

01 Post-install Aula: pas a pas com un script

Engagar la màquina vagrant en mode bridge i iniciar sessió dins per poder anar seguint i aplicant les evolucions en el playbook.

Vagrantfile

```
$ cat Vagrantfile
# -*- mode: ruby -*-
# vi: set ft=ruby :

Vagrant.configure("2") do |config|
  config.vm.synced_folder ".", "/vagrant"

  config.vm.provider "virtualbox" do |vb|
    vb.memory = 4096
    vb.cpus = 2
  end

  config.vm.define "server" do |srv|
    srv.vm.box = "debian/bullseye64"
    #srv.vm.network "private_network", ip: "192.168.56.10"
    srv.vm.network "public_network", bridge: "enpl0"
    srv.vm.provision "shell", inline: $install_ssh_pubkey_script_debian
  end

  $install_ssh_pubkey_script_debian = <<SCRIPT
sudo useradd -m -s /bin/bash ansible
sudo mkdir /home/ansible/.ssh
sudo cp /vagrant/ansible_key.pub /home/ansible/.ssh/authorized_keys
sudo chown -R ansible.ansible /home/ansible/.ssh/
sudo sh -c 'echo "ansible ALL=(ALL) NOPASSWD: ALL" >> /etc/sudoers.d/ansible'
SCRIPT
```

Iniciar sessió vagrant i anotar l'adreça IP. En l'exemple del llista usa una adreça IP privada, comentar / descomentar segons correspongui.

```
$ vagrant ssh
Linux bullseye 5.10.0-20-amd64 #1 SMP Debian 5.10.158-2 (2022-12-13) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
```

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law.

vagrant@bullseye:~\$ ip a

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:8d:c0:4d brd ff:ff:ff:ff:ff:ff
    altname enp0s3
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic eth0
        valid_lft 85995sec preferred_lft 85995sec
    inet6 fe80::a00:27ff:fe8d:c04d/64 scope link
        valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:0f:31:47 brd ff:ff:ff:ff:ff:ff
    altname enp0s8
    inet 192.168.56.10/24 brd 192.168.56.255 scope global eth1
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe0f:3147/64 scope link
        valid_lft forever preferred_lft forever
```

playbook.yml

```
---
- name: Post Install Aula (F2G)
  hosts: servernet
  become: true
  tasks:
    - name: Print message
      ansible.builtin.debug:
        msg: Installing

    - name: Install packages
      ansible.builtin.apt:
        state: latest
        pkg:
          - tree
          - rmap
          - vim
          - vim-gtk3
          - nc
          - geany
          - aptitude
          - git
          - openssh-server
          - krb5-user
          - krb5-multidev
          - libpam-mount
          - sssd
          - nfs-common
          - autofs
          - ufw
          - curl
          - gpm
          - pwgen
        update_cache: yes

    - name: Remove packages
      ansible.builtin.apt:
        name: gnome-games
        state: absent

    - name: Remove dependencies that are no longer required
      ansible.builtin.apt:
        autoremove: yes

    - name: Copy file sssd.conf
      ansible.builtin.copy:
        src: ./sssd.conf
        dest: /etc/sssd
        owner: root
        group: root
        mode: '0600'
        ignore_errors: true

    - name: Copy file sudoers.d inf
      ansible.builtin.copy:
        src: ./inf
        dest: /etc/sudoers.d
        owner: root
        group: root
        ignore_errors: true

    - name: Pam Auth Update
      ansible.builtin.command: pam-auth-update --enable mkhomedir sss systemd pwquality unix libpam-mount

    - name: Disable services
      ansible.builtin.service:
        name: "{{ item }}"
        enabled: no
        loop: [ sssd-autofs.socket, sssd-nss.socket ]

    - name: Disable services
      ansible.builtin.service:
        name: "{{ item }}"
        enabled: yes
        loop: [ sssd, rpc-gssd ]

    - name: Add contrib and nonfree to all repos (sed -i '/^[^#]/ s/main$/main contrib non-free/' /etc/apt/sources.list)
      ansible.builtin.apt_repository:
        filename: inf
        repo: "{{ item }}"
        state: present
        loop:
          - deb https://deb.debian.org/debian bullseye contrib non-free
          - deb https://security.debian.org/debian-security bullseye-security contrib non-free
          - deb https://deb.debian.org/debian bullseye-updates contrib non-free
          - deb https://deb.debian.org/debian bullseye-backports contrib non-free

    - name: Install packages (contrib non-free)
      ansible.builtin.apt:
```

```

pkg: [ chromium, vlc, gimp, tig, meld, gnome-shell-extension-desktop-icons, terminator,
      firmware-realtek, firmware-misc-nonfree, hunspell-ca, hunspell-es ]
update_cache: true

- name: Install kernel headers
  ansible.builtin.apt:
    name: linux-headers-{{ ansible_kernel }}
    state: latest

- name: Hold apt-get and aptitude automatic updates linux-headers and linux-images
  ansible.builtin.shell: "{{ item }}"
  loop:
    - apt-mark hold linux-image-${uname -r}
    - apt-mark hold linux-headers-${uname -r}
    - aptitude hold linux-image-${uname -r}
    - aptitude hold linux-headers-${uname -r}
  #- sed -i 's/#WaylandEnable=false/WaylandEnable=false/' /etc/gdm3/daemon.conf

- name: Replace WaylandEnable
  ansible.builtin.replace:
    path: /etc/hosts
    regexp: 'WaylandEnable=false'
    replace: 'WaylandEnable=false'

# -----
# Mètode (1)
- name: Test if exists epoptes probe line in /etc/hosts
  ansible.builtin.shell: grep -c "10.200.247.246 profef2G.informatica.escoladeltreball.org server" /etc/hosts || true
  register: test_grep

- name: add epoptes probe host server to /etc/hosts
  ansible.builtin.lineinfile:
    dest: /etc/hosts
    line: 10.200.247.246 profef2G.informatica.escoladeltreball.org server
    when: test_grep.stdout == "0"

# -----
# Mètode (2)
- name: Check if epoptes probe host exists in /etc/hosts
  lineinfile:
    state: absent
    path: /etc/hosts
    regexp: "10.200.247.246 profef2G.informatica.escoladeltreball.org server"
    check_mode: true
    changed_when: false
    register: check

- name: if line not exists add it to /etc/hosts
  lineinfile:
    state: present
    path: /etc/hosts
    line: 10.200.247.246 profef2G.informatica.escoladeltreball.org server
    when: check.found == 0

# -----
- name: Install epoptes client
  ansible.builtin.apt:
    name: epoptes-client
    install_recommends: yes

- name: Start epoptes and get server key
  ansible.builtin.shell: epoptes-client -c profef2G.informatica.escoladeltreball.org
  ignore_errors: true

```

Executar el playbook i observar les task on hi ha canvis d'estat i on no i en quins casos s'ignora si el resultat falla.

```
$ ansible-playbook -u ansible --key-file ansible_key -i inventory_privat.yaml playbook.yaml
```

```
PLAY [Post Install Aula (F2G)]
```

```
*****
**
```

```
TASK [Gathering Facts]
```

```
*****
**
```

```
ok: [server]
```

```
TASK [Print message]
```

```
*****
**
```

```
ok: [server] => {
  "msg": "Installing"
}
```

```
TASK [Install packages]
```

```
*****
**
```

```
changed: [server]
```

```
TASK [Remove packages]
```

```
*****
**
```

```
ok: [server]
```

```
TASK [Remove dependencies that are no longer required]
```

```
*****
**
```

```
ok: [server]
```

```
TASK [Copy file sssd.conf]
```

```
*****
**
```

```
changed: [server]
```

```

TASK [Copy file sudoers.d inf]
*****
**
changed: [server]

TASK [Pam Auth Update]
*****
**
changed: [server]

TASK [Disable services]
*****
**
changed: [server] => (item=sssd-autofs.socket)
changed: [server] => (item=sssd-nss.socket)

TASK [Disable services]
*****
**
ok: [server] => (item=sssd)
ok: [server] => (item=rpc-gssd)

TASK [Add contrib and nonfree to all repos (sed -i '/^[^#]/ s/main$/main contrib
non-free/' /etc/apt/sources.list)] *****
changed: [server] => (item=deb https://deb.debian.org/debian bullseye contrib non-free)
changed: [server] => (item=deb https://security.debian.org/debian-security bullseye-security contrib non-free)
changed: [server] => (item=deb https://deb.debian.org/debian bullseye-updates contrib non-free)
changed: [server] => (item=deb https://deb.debian.org/debian bullseye-backports contrib non-free)

TASK [Install kernel headers]
*****
**
changed: [server]

TASK [Hold apt-get and aptitude authomatic updates linux-headers and linux-images]
*****
changed: [server] => (item=apt-mark hold linux-image-${uname -r})
changed: [server] => (item=apt-mark hold linux-headers-${uname -r})
changed: [server] => (item=aptitude hold linux-image-${uname -r})
changed: [server] => (item=aptitude hold linux-headers-${uname -r})

TASK [Replace WaylandEnable]
*****
**
ok: [server]

TASK [Test if exists epoptes probe line in /etc/hosts]
*****
changed: [server]

TASK [add epoptes probe host server to /etc/hosts]
*****
changed: [server]

TASK [Check if epoptes probe host exists in /etc/hosts]
*****
ok: [server]

TASK [if line not exists add it to /etc/hosts]
*****
**
skipping: [server]

TASK [Install epoptes client]
*****
*****
changed: [server]

TASK [Start epoptes and get server key]
*****
**
fatal: [server]: FAILED! => {"changed": true, "cmd": "epoptes-client -c profeF2G.informatica.escoladeltreball.org",
"delta": "0:02:09.842922", "end": "2023-02-23 16:07:26.147096", "msg": "non-zero return code", "rc": 1, "start":
"2023-02-23 16:05:16.304174", "stderr": "140304346826048:error:0200206E:system library:connect:Connection timed
out:../crypto/bio/b_sock2.c:110:\n140304346826048:error:2008A067:BIIO routines:BIIO_connect:connect
error:../crypto/bio/b_sock2.c:111:\nconnect:errno=110\nepoptes-client ERROR: Failed to fetch certificate from
profeF2G.informatica.escoladeltreball.org:789", "stderr_lines": ["140304346826048:error:0200206E:system

```

```
library:connect:Connection timed out:../crypto/bio/b_sock2.c:110:", "140304346826048:error:2008A067:BIO
routines: BIO_connect:connect error:../crypto/bio/b_sock2.c:111:", "connect:errno=110", "epoptes-client ERROR: Failed to
fetch certificate from profeF2G.informatica.escoladeltreball.org:789"]], "stdout": "", "stdout_lines": []}
...ignoring
```

PLAY RECAP

```
*****
*****
server      : ok=20    changed=13    unreachable=0    failed=0    skipped=1    rescued=0    ignored=1
```

Descripció del playbook per parts

Task 01

Iniciar un nou playbook amb “---”, indicar que actua sobre els hosts de servernet (un sol servidor) i que la connexió ssh ha d’esdevenir amb sudo un usuari privilegiat.

Aquesta primera tasca simplement és un missatge de debug indicant que es procedeix a la instal·lació. Utilitza el mòdul “[ansible.builtin.debug](#)” que permet mostrar missatges en el procés de debug que es realitza mentre fa l’aplicació del playbook.

```
---
- name: Post Install Aula (F2G)
  hosts: servernet
  become: true
  tasks:
    - name: Print message
      ansible.builtin.debug:
        msg: Installing
```

Task 02

Actualitzar amb el mòdul “[ansible.builtin.apt](#)” la informació dels repositoris amb l’opció “*update_cache*” que és equivalent al “*apt-get update*”.

Instal·lar un conjunt de paquets definits en format de llista extesa de YAML. L’opció “*state=latest*” assegura que s’instal·la la darrera versió possible. Si s’indica “*state=present*” simplement s’assegura que el paquet està instal·lat, però no que és la última versió.

```
- name: Install packages
  ansible.builtin.apt:
    state: latest
    pkg:
      - tree
      - nmap
      - vim
      - vim-gtk3
      - mc
      - geany
      - aptitude
      - git
      - openssh-server
      - krb5-user
      - krb5-multidev
      - libpam-mount
```

```
- sssd
- nfs-common
- autofs
- ufw
- curl
- gpm
- pwgen
update_cache: yes
```

Task 03

Eliminar els paquets amb el mòdul apt indicant que l'estat desitjat és “*state=absent*”. Si no estan instal·lats no s'instal·la i si ho estan s'eliminen.

```
- name: Remove packages
  ansible.builtin.apt:
    name: gnome-games
    state: absent
```

Task 04

Aplicar l'opció del mòdul apt equivalent a realitzar l'ordre “*apt-get autoremove*” que elimina tots aquells paquets del sistema innecessaris.

```
- name: Remove dependencies that are no longer required
  ansible.builtin.apt:
    autoremove: yes
```

Task 05

Copiar un fitxer de configuració que està al host (extern) al guest destí (en aquest cas a la màquina virtual vagrant). Es copia el fitxer de configuració sssd.conf que configura els serveis d'autenticació.

S'utilitza el mòdul “*ansible.builtin.copy*” que permet indicar:

- **src**: la ubicació relativa o absoluta del fitxer al host (exterior).
- **dest**: la ubicació absoluta del fitxer en el host remot.
- **owner**: el propietari al que s'assigna el fitxer.
- **group**: el grup al que s'assigna el fitxer.
- **mode**: els permisos que s'assignen al fitxer.

```
- name: Copy file sssd.conf
  ansible.builtin.copy:
    src: ./sssd.conf
    dest: /etc/sssd
    owner: root
    group: root
    mode: '0600'
    ignore_errors: true
```

S'ha afegit l'opció “*ignore_errors:true*” perquè si en el moment d'aplicar el playbook no existeix localment en el host el fitxer de configuració no es pari el playbook i es continui executant les tasques següents.

Task 07

Igual que en la tasca anterior en aquesta tasca es copia un fitxer de configuració extern del host a la màquina remota. En aquest cas es tracta del fitxer de configuració de sudo.

```
- name: Copy file sudoers.d inf
  ansible.builtin.copy:
    src: ./inf
    dest: /etc/sudoers.d
    owner: root
    group: root
    ignore_errors: true
```

Task 08

Executar la comanda externa pam-auth-update que realitza la configuració dels mòduls PAM. En especial en aquest desplegament s'utilitza per assegurar-se d'activar el pam_mkhome.so que crea el home de l'usuari si no existeix. Les altres opcions indiquen els mecanismes d'autenticació a implementar.

Es passa l mòdul “[ansible.builtin.command](#)” directament tota l'ordre a executar.

```
- name: Pam Auth Update
  ansible.builtin.command: pam-auth-update --enable mkhomedir sss systemd
  pwquality unix libpam-mount
```

Task 09

Desactiva un conjunt de serveis aplicant el mòdul de gestió de serveis “[ansible.builtin.service](#)”. Amb l'opció “enabled: no” s'assegura de fer el “systemctl disable” dels serveis indicats.

En aquesta task en el lloc corresponent a indicar el nom del servei hi ha l'element “[{{ item }}](#)” que és un placeholder per a cada un dels elements indicats a sota. Utilitzar “[loop](#)” iterarà per a cada un dels noms que formen la llista compacta de YAML que conté els serveis a desabilitar.

Aquesta és la manera de definir un conjunt d'elements (la llista pot ser explícita o compacta) sobre els que aplicar una acció.

```
- name: Disable services
  ansible.builtin.service:
    name: "{{ item }}"
    enabled: no
  loop: [ sssd-autofs.socket, sssd-nss.socket ]
```

Task 10

Usant el mòdul `service` s'itera per els serveis que es volen habilitar. És l'equivalent a fer “`systemctl enable`” dels serveis.

```
- name: Enable services
  ansible.builtin.service:
    name: "{{ item }}"
    enabled: yes
  loop: [ sssd, rpc-gssd ]
```

Task 11

Configurar els repositoris estàndard de debian de apt per tal d'incorporar a part de main també `contrib` i `non-free`.

Hi ha diverses maneres de fer-ho, una d'elles és editar el fitxer `/etc/apt/sources.list` i usant mòduls de processament de text com per exemple `ansible.builtin.lineinfile` o `ansible.builtin.replace` o `ansible.builtin.template` i modificar les línies ja existents afegint-hi les dues paraules requerides. Aquest mecanisme implica treballar amb patrons d'expressió regular.

En aquesta task s'ha optat per un mecanisme més senzill que és generar de nou les línies però només per a `contrib` i `non-free` (observar que no hi ha main). Per defecte es generen en un nou fitxer dins del directori de subconfiguracions `/etc/apt/sources.list.d/<nom-auto-generat>`. En aquest cas el nom del fitxer s'ha especificat que sigui `inf`.

Així, doncs, hi haurà el fitxer amb els repositoris estàndard provinents de la instal·lació del Debian (`/etc/apt/sources.list`) que contenen main, i s'afegirà el fitxer `/etc/apt/sources.list.d/inf` que conté els mateixos repositori (les url) però amb `contrib` i `non-free`. El mòdul usat és el “`ansible.builtin.repository`” que permet definir repositoris apt.

```
- name: Add contrib and nonfree to all repos (sed -i '/^[*]/ s/main/main contrib non-free/' /etc/apt/sources.list)
  ansible.builtin.apt_repository:
    filename: inf
    repo: "{{ item }}"
    state: present
  loop:
    - deb https://deb.debian.org/debian bullseye contrib non-free
    - deb https://security.debian.org/debian-security bullseye-security contrib non-free
    - deb https://deb.debian.org/debian bullseye-updates contrib non-free
    - deb https://deb.debian.org/debian bullseye-backports contrib non-free
```

Task 12

Aquesta tasca instala de nou paquets amb apt. No s'han instal·lat abans perquè requerien de la configuració anterior per usar els repositoris amb `contrib` i `non-free`.

Abans de la instal·lació cal fer l'equivalent al “`apt-get update`” per rellegir dels repositoris que es fa amb l'opció “`update_cache: true`”.

```

- name: Install packages (contrib non-free)
  ansible.builtin.apt:
    pkg: [ chromium, vlc, gimp, tig, meld,
          gnome-shell-extension-desktop-icons,
          terminator, firmware-realtek, firmware-misc-nonfree, hunspell-ca,
          hunspell-es ]
    update_cache: true

```

Task 13

Aquesta tasca actualitza amb apt els headers del kernel (necessaris per exemple per Virtualbox). Per indicar la versió de kernel no es fa explícitament sinó que s'utilitza la variable `{{ ansible_kernel }}` que serà substituïda pel valor apropiat proporcionat per ansible.

```

- name: Install kernel headers
  ansible.builtin.apt:
    name: linux-headers-{{ ansible_kernel }}
    state: latest

```

Task 14

Aquest tasca executa un conjunt d'ordres shell usant el mòdul `ansible.builtin.shell`. Cada una de les ordres a usar esta en la llista i s'hi itera a través de `{{ item }}` i loop:.

S'utilitza aquest mòdul i no el mòdul `ansible.builtin.command` perquè les ordres a realitzar contenen expansions. Quan cal usar expansions, command substitution, redireccions, etc el mòdul command no serveix i cal usar el mòdul shell.

La finalitat d'aquesta tasca és marcar els paquets del kernel i dels headers perquè no s'actualitzin automàticament.

```

- name: Hold apt-get and aptitude automatic updates
  ansible.builtin.shell: "{{ item }}"
  loop:
    - apt-mark hold linux-image-$(uname -r)
    - apt-mark hold linux-headers-$(uname -r)
    - aptitude hold linux-image-$(uname -r)
    - aptitude hold linux-headers-$(uname -r)

```

Task 15

Aquesta tasca desactiva Wayland de manera que la pantalla d'inici passarà a usar Xorg. Fa ús del mòdul `ansible.builtin.replace` que permet aplicar recerca i substitució similar a com ho fa l'ordre de sistema operatiu sed.

```

- name: Replace WaylandEnable
  ansible.builtin.replace:
    path: /etc/hosts
    regexp: '#WaylandEnable=false'
    replace: 'WaylandEnable=false'

```

Part del playbook corresponent a epoptes

Les tasques finals del playbook instal·len i configuren el client de epoptes. Es fa dues vegades usant dos mètodes diferents, simplement a mode de demostració de mecanismes alternatius per fer la mateixa tasca.

Tot i això aquesta és una primera aproximació simplista i rude. Caldria aplicar variables i templates per fer-ho més professionalment.

Els dos mètodes diferents són per com es configura el fitxer `/etc/hosts` per tal d'incorporar la resolució de nom del servidor epoptes de l'aula.

Atenció: Cal tenir present que s'ha de buscar una manera d'afegir una entrada al `/etc/hosts` que sigui idempotent. És a dir, no podem fer simplement un `echo "text" >> /etc/hosts` perquè cada vegada que s'apliqués el palybook generaria una nova línia.

Exemple incorrecte:

```
# Atenció, aquesta tasca NO és idempotent!
#- name: Add Profe host to the /etc/hosts
#  ansible.builtin.shell: echo "10.200.247.246
profeF2G.informatica.escoladeltreball.org server" >> /etc/hosts
```

Mòdel (1)

Task 16

Per resoldre el problema de l'actualització del `/etc/hosts` s'utilitzen dues tasques conjuntes. Aquesta primera executa amb shell una ordre `grep` per buscar si ja existeix o no l'entrada al fitxer `/etc/hosts`. El resultat del `grep` queda en registrar a la variable `test-grep` usant `register: test_grep`.

Observar que l'execució d'una ordre al shell com `grep` retorna un status d'execució de correcte si troba el text i d'error si no el troba. Però no es vol que un error (si el text no existeix) pari el playbook, per això s'emmarca el valor de retorn amb un `|| true` que garanteix que l'ordre executada amb shell sempre es considera *ok* i no *fail*.

```
- name: Test if exists epoptes profe line in /etc/hosts
  ansible.builtin.shell: grep -c "10.200.247.246
profeF2G.informatica.escoladeltreball.org server" /etc/hosts || true
  register: test_grep
```

Task 17

Aquesta tasca només s'executa quan la tasca anterior ha desat a la variable `test_grep` el valor 0, que indica que no ha trobat la línia buscada en el fitxer `/etc/hosts`. Aquesta condició s'estableix amb l'opció `when`.

Amb when s'indica quan cal aplicar el mòdul, n aquest cas el mòdul “[ansible.builtin.lineinfile](#)” que és un mòdul que permet gestionar text, línies de text, en fitxers. En concret afegeix la línia indicada al fitxer /etc/hosts.

```
- name: add epoptes profe host server to /etc/hosts
  ansible.builtin.lineinfile:
    dest: /etc/hosts
    line: 10.200.247.246 profeF2G.informatica.escoladeltreball.org server
    when: test_grep.stdout == "0"
```

Mètode (2)

Task 18

El procés que es segueix és similar al del mètode anterior: una primera tasca s'encarrega de registrar en una variable si la línia buscada es troba o no dins del fitxer /etc/hosts. Una segona tasca que s'activa només si la línia no hi és, llavors l'afegeix.

Aquesta tasca usa el mòdul “[ansible.builtin.lineinfile](#)” amb l'opció “state=absent” i “check_mode: true” que valida si la línia està present o no en el fitxer /etc/hosts.

El resultat del check es desa a la variable “check” amb l'opció “register: check”, que servira de referència a la propera tasca per saber si cal afegir o no la línia.

Igual que passava en el mètode anterior la línia pot ser-hi o no i per tant l'execució d'aquesta tasca pot generar *ok* i *fail*, però no es vol aturar l'execució del playbook. Per això hi ha l'opció “[changed_when: false](#)” que indica que quan la tasca falli en lloc de retornar fail retorni *ok* (una manera més acadèmica de fer el que el mètode anterior feia amb “|| true”).

```
- name: Check if epoptes profe host exists in /etc/hosts
  lineinfile:
    state: absent
    path: /etc/hosts
    regexp: '10.200.247.246 profeF2G.informatica.escoladeltreball.org server'
    check_mode: true
    changed_when: false
    register: check
```

Task 19

Si la variable “check” de la tasca anterior conté 0 significa que la línia no era al fitxer /etc/fstab i per tant cal afegir-la. S'afegeix usant el mateix mòdul “[ansible.builtin.lineinfile](#)” i ho indica l'opció “state: present”.

```
- name: if line not exists add it to /etc/hosts
  lineinfile:
    state: present
    path: /etc/hosts
    line: 10.200.247.246 profeF2G.informatica.escoladeltreball.org server
    when: check.found == 0
```

Task 20

Aquesta tasca instal·la amb apt el paquet del eoptes client utilitzant l'opció "install_recommends".

```
- name: Install eoptes client
  ansible.builtin.apt:
    name: eoptes-client
    install_recommends: yes
```

Task 21

Aquesta tasca engega el client de eoptes tot obtenint la clau d'accés ssh pública del servidor. S'executa usant el mòdul shell i s'hi indica l'opció "ignore_errors" perquè pot ser que el servidor no estigui apropiadament configurat i no sigui capaç de contactar-hi o d'obtenir-ne la key.

Aquesta tasca segurament trigarà, i més si al final ha de fallar... Però no generarà error en el playbook.

```
- name: Start eoptes and get server key
  ansible.builtin.shell: eoptes-client -c
  profef2g.informatica.escoladelatreball.org
  ignore_errors: true
```

Execució del playbook

En l'execució d'un playbok es pot executar tot de cop o per parts, les opcions més usuals són:

- Llistar les tasques de què es compona
- Executar totes les tasques
- Executar les tasques una a una demanant confirmació.
- Executar les tasques començant a partir d'una tasca determinada.
- Executar les tasques que tenen o no tenen un tag

Llistar les tasques d'un playbook

```
$ ansible-playbook --list-tasks playbook.yaml
[WARNING]: provided hosts list is empty, only localhost is available. Note that
the implicit localhost does not match 'all'
[WARNING]: Could not match supplied host pattern, ignoring: servernet

playbook: playbook.yaml

play #1 (servernet): Post Install Aula (F2G)      TAGS: []
tasks:
  Print message      TAGS: []
  Install packages   TAGS: []
  Remove packages    TAGS: []
  Remove dependencies that are no longer required      TAGS: []
  Copy file sssd.conf      TAGS: []
  Copy file sudoers.d infTAGS: []
  Pam Auth Update TAGS: []
```

```

Disable services          TAGS: []
Enable services TAGS: []
Add contrib and nonfree to all repos TAGS: []
Install packages (contrib non-free) TAGS: []
Install kernel headers TAGS: []
Hold apt-get and aptitude automatic updates linux-headers and linux-images
TAGS: []
Replace WaylandEnable TAGS: []
Test if exists epoptes probe line in /etc/hosts TAGS: []
add epoptes probe host server to /etc/hosts TAGS: []
Check if epoptes probe host exists in /etc/hosts TAGS: []
if line not exists add it to /etc/hosts TAGS: []
Install epoptes client TAGS: []
Start epoptes and get server key TAGS: []

```

Executar les tasques una a una demanant confirmació.

```
$ ansible-playbook -u ansible --key-file ansible_key -i inventory_privat.yaml --step
playbook.yaml
```

```

PLAY [Post Install Aula (F2G)]
*****
*****
Perform task: TASK: Gathering Facts (N)o/(y)es/(c)ontinue: y

Perform task: TASK: Gathering Facts (N)o/(y)es/(c)ontinue:
*****

TASK [Gathering Facts]
*****
*****
ok: [server]
Perform task: TASK: Print message (N)o/(y)es/(c)ontinue: y

Perform task: TASK: Print message (N)o/(y)es/(c)ontinue:
*****

TASK [Print message]
*****
*****
ok: [server] => {
    "msg": "Installing"
}
Perform task: TASK: Install packages (N)o/(y)es/(c)ontinue:

```

Executar les tasques començant a partir d'una tasca determinada.

```
$ ansible-playbook -u ansible --key-file ansible_key -i inventory_privat.yaml
--start-at-task "Copy file sssd.conf" playbook.yaml
```

```

PLAY [Post Install Aula (F2G)]
*****
*****

TASK [Gathering Facts]
*****
*****
ok: [server]

TASK [Copy file sssd.conf]
*****
*****
ok: [server]

TASK [Copy file sudoers.d inf]
*****
*****
ok: [server]

TASK [Pam Auth Update]
*****
*****

```

```

changed: [server]

TASK [Disable services]
*****
*****
ok: [server] => (item=sssd-autofs.socket)
ok: [server] => (item=sssd-nss.socket)
...

```

Executar les tasques amb un tag determinat

```

- name: Test if exists epoptes profe line in /etc/hosts
  ansible.builtin.shell: grep -c "10.200.247.246
  profeF2G.informatica.escoladeltreball.org server" /etc/hosts || true
  register: test_grep
  tags:
    - epoptes
    - metodel

- name: add epoptes profe host server to /etc/hosts
  ansible.builtin.lineinfile:
    dest: /etc/hosts
    line: 10.200.247.246 profeF2G.informatica.escoladeltreball.org server
  when: test_grep.stdout == "0"
  tags:
    - epoptes
    - metodel

```

```

$ ansible-playbook -u ansible --key-file ansible_key -i inventory_privat.yaml -t
epoptes,metodel playbook.yaml

PLAY [Post Install Aula (F2G)]
*****
*****

TASK [Gathering Facts]
*****
*****
ok: [server]

TASK [Test if exists epoptes profe line in /etc/hosts]
*****
changed: [server]

TASK [add epoptes profe host server to /etc/hosts]
*****
****
skipping: [server]

PLAY RECAP
*****
*****
server      : ok=2    changed=1    unreachable=0    failed=0
skipped=1   rescued=0   ignored=0

```

```

$ ansible-playbook -u ansible --key-file ansible_key -i inventory_privat.yaml
-skip-tags epoptes,metodel playbook.yaml

```

02 Post-install Aula: usar variables

Ansible up & running

Documentació

Tutorial vídeo sencer:

<https://www.youtube.com/watch?v=Wz8zAU-0uR4>

Github amb code samples del llibre

<https://github.com/ansiblebook/ansiblebook>

Book Ansible up & running 3rd edition (part)

https://edu.anarcho-copy.org/GNU%20Linux%20-%20Unix-Like/DevOps/Ansible_Up%20and%20Running%203ED%20ER.pdf

Codi online:

<https://github.com/ansiblebook>

Book Ansible up & running 2th edition pdf

<https://www.pdfdrive.com/ansible-up-and-running-e187539038.html>
<https://www.pdfdrive.com/download.pdf?id=187539038&h=54969c2d424d0a8ca3f3839fa3fe2bcf&u=cache&ext=pdf>

Ansible up & running 3r edition Video Tutorials

<https://www.oreilly.com/library/view/introduction-to-ansible/9781491955956/video245950.html>

<https://www.oreilly.com/library/view/introduction-to-ansible/9781491955956/>

<https://www.oreilly.com/library/view/introduction-to-ansible/9781491955956/video245965.html>

Són tots compactats en un video de youtube:

<https://www.youtube.com/watch?v=Wz8zAU-0uR4>

Chapter 1 Introduction

Desplegament del lab i iniciació a ansible

- Desplegar els hosts amb Vagrant (server: 172.30.30.10, worker1: 172.30.30.11, worker2: 172.30.30.12 i worker3: 172.30.30.13).
- Verificar l'accés amb l'usuari ansible.
- Configurar l'inventory.
- Test amb ping de l'inventory.
- Configuració d'ansible amb *ansible.cfg*.
- Mòdul per fer ordres del sistema: command.

Engregar el lab de Vagrant

- Engregar el lab, mostrar els hosts actius i observar quina és la clau ssh privada de vagrant per si es vol usar accés a les màquines virtuals amb la clau ssh que genera vagrant.

```
$ vagrant up

$ vagrant status
Current machine states:

server                running (virtualbox)
worker1              running (virtualbox)
worker2              running (virtualbox)
worker3              running (virtualbox)

$ vagrant ssh-config server
Host server
  HostName 127.0.0.1
  User vagrant
  Port 2222
  UserKnownHostsFile /dev/null
  StrictHostKeyChecking no
  PasswordAuthentication no
  IdentityFile /home/images/ansible/ansible_up_and_running/chapter1/.vagrant/machines/server/virtualbox/private_key
  IdentitiesOnly yes
  LogLevel FATAL
```

Com que a les nostre smàquines s'ha creat un usuari ansible que pot esdevenir administrador amb sudo, podem accedir-hi per ssh:

```
$ ssh -i ansible_key ansible@172.30.30.10
ansible@bullseye:~$
```

Inventory

Anem a fer diferents tipus d'inventory:

- Inventory general preparat per a fer les pràctiques amb el lab de 4 màquines virtuals en YAML

- El mateix en format INI.
- Inventory només del server amb accés via l'usuari vagrant i la clau privada ssh generada automàticament per vagrant.
- Inventory per accedir només al server usant l'usuari ansible i la clau provada preparada per nosaltres per a l'usuari ansible.

Inventory per al lab de vagrant amb una xarxa servernet amb el server, una workersnet amb els tres workers i una supraxarxa vagrantlab que inclou les altres dues. Aquest inventory és en format YAML.

```
$ cat inventory_lab_private.yaml
servernet:
  hosts:
    server:
      ansible_host: 172.30.30.10

workersnet:
  hosts:
    worker1:
      ansible_host: 172.30.30.11
    worker2:
      ansible_host: 172.30.30.12
    worker3:
      ansible_host: 172.30.30.13
      # per la connexió
      #ansible_user: vagrant
      #ansible_password: vagrant
      #ansible_become: yes

vagrantlab:
  children:
    servernet:
    workersnet:

$ ansible-inventory -i inventory_lab_private.yaml --list
```

Inventory per al lab de vagrant amb una xarxa servernet amb el server, una workersnet amb els tres workers i una supraxarxa vagrantlab que inclou les altres dues. Aquest inventory és en format INI.

```
$ cat inventory_lab_private.ini
[servernet]
172.30.30.10

[workersnet]
172.30.30.11
172.30.30.12
172.30.30.13

[vagrantlab:children]
servernet
workersnet

$ ansible-inventory -i inventory_lab_private.ini --list
```

Inventory per accedir a la VM amb l'usuari vagrant i la clau privada ssh enerada automàticament per vagrant. Accedeix al localhost (no a la ip de la VM) al port 2222 que és on vagrant propaga el port ssh de la màquina virtual. Format INI.

```
$ cat inventory_vagrant.ini
```

```
[webservers]
testserver ansible_port=2222
[webservers:vars]
ansible_host=127.0.0.1
ansible_user = vagrant
ansible_private_key_file = .vagrant/machines/server/virtualbox/private_key

$ ansible-inventory -i inventory_vagrant.ini --list
```

```
$ cat inventory_ansible.ini
[webservers]
testserver ansible_port=22
[webservers:vars]
ansible_host=172.30.30.10
ansible_user = ansible
ansible_private_key_file = ansible_key

$ ansible-inventory -i inventory_ansible.ini --list
```

```
$ cat inventory_aws.ini
[webservers]
testserver ansible_host=ec2-203-0-113-120.compute-1.amazonaws.com
[webservers:vars]
ansible_user=ec2-user
ansible_private_key_file=/path/to/keyfile.pem

$ ansible-inventory -i inventory_aws.ini --list
```

Test amb ping de la inventory

Podem verificar la connectivitat d'ansible amb els hosts que formen part de l'inventory realitzant un ping amb la ordre *ansible* i indicant el mòdul *ping*.

- Podem indicar les options una a una (xarxa, inventari, usuari, clau privada ssh)
- Si la informació ja es troba en el fitxer INI o yAML no cal indicar-la.
- *nota* atenció a la gestió dels fingerprints (claus de host) dels hosts destí del SSH que han d'estar al fitxer *.ssh/known_hosts*.

Exemple fent ping a tot l'inventory yaml

```
$ ansible all -i inventory_lab_private.yaml -u ansible --key-file ansible_key -m ping
worker3 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
server | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
worker1 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
worker2 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

Exemple fent ping només a servernet de INI

```
$ ansible servernet -i inventory_lab_private.ini -u ansible --key-file ansible_key -m ping
172.30.30.10 | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

Exemple fent ping usant l'usuari vagrant als workers

```
$ ansible webservers -i inventory_vagrant.ini -m ping
testserver | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

Exemple usant l'usuari ansible fent ping a tot l'inventory (només té un host)

```
$ ansible all -i inventory_ansible.ini -m ping
testserver | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

Configuració d'ansible amb ansible.cfg

Es pot personalitzar la configuració d'ansible i en especial les opcions que es vol evitar posar constantment a la línia d'ordres amb el fitxer [ansible.cfg](#). Aquest fitxer pot tenir varius àmbits:

- file specified by the ANSIBLE_CONFIG environment variable
- ./ansible.cfg (ansible.cfg in the current directory)
- ~/.ansible.cfg (.ansible.cfg in your home directory)
- /etc/ansible/ansible.cfg

En el següent exemple es pot observar un fitxer de configuració ansible local al directori de desplegament. Aquest fitxer permet definir el nom de l'inventory a usar de manera que no caldrà passar-lo amb el *-i nom-inventory*. Una altra opció molt interessant és [host_key_checking](#) que permet indicar al SSH que no faci la ferragossa

```
$ cat ansible.cfg
[defaults]
inventory = inventory_ansible.ini
host_key_checking = false
stdout_callback = yaml
callback_enabled = timer
```

Podem observar com sense indicar l'inventory ha efectuat el ping

```
$ ansible all -m ping
```

```
testserver | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "ping": "pong"
}
```

Mòdul command

Aquest mòdul [command](#) permet realitzar ordres en els hosts destí. De fet és el mòdul per defecte que s'utilitza si no s'indica. Per passar quina ordre a fer i amb quines opcions s'utilitza [-a ordre-i-opcions](#) que és allò que ha de fer.

Mostrar uptime

```
$ ansible all -m command -a uptime 2> /dev/null
testserver | CHANGED | rc=0 >>
 16:36:47 up 59 min,  1 user,  load average: 0.02, 0.03, 0.01
```

Mostrar uname -a (observar la encapsulació)

```
$ ansible all -m command -a "uname -a" 2> /dev/null
testserver | CHANGED | rc=0 >>
Linux bullseye 5.10.0-20-amd64 #1 SMP Debian 5.10.158-2 (2022-12-13) x86_64 GNU/Linux
```

Si l'usuari de la connexió (ansible en aquest exemple) no té permisos per realitzar l'ordre, com per exemple usar apt-get, aquesta fallarà.

```
$ ansible all -m command -a "apt-get update" 2> /dev/null
testserver | FAILED | rc=100 >>
Reading package lists...E: List directory /var/lib/apt/lists/partial is missing. -
Acquire (13: Permission denied)non-zero return code
```

Observem en l'exemple següent que falla l'execució de tree i nmap perquè aquestes ordres no estan instal·lades al sistema.

```
$ ansible all -m command -a "tree" 2> /dev/null
testserver | FAILED | rc=2 >>
[Errno 2] No such file or directory: b'tree'

$ ansible all -m command -a "nmap" 2> /dev/null
testserver | FAILED | rc=2 >>
[Errno 2] No such file or directory: b'nmap'
```

Mòdul package

Amb el mòdul [package](#) es poden realitzar accions relatives a la gestió de packets, instal·lar, desinstal·lar, etc. Pot passar, però, que:

- no trobi el paquet perquè no ha actualitzat la lista de repositoris, llavors cal fer prèviament aquesta actualització. En aquest cas cal afegir l'opció [update_cache=yes](#).

- No tingui permisos per a fer l'acció perquè necessita ser un usuari privilegiat. En aquest cas cal indicar que cal escalar privilegis. Per poder fer-ho cal usar l'opció **-b** o **--become**.

Exemple on s'intenten instal·lar els paquets tree i nmap i falla

```
$ ansible all -b -m package -a name=tree
testserver | FAILED! => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "msg": "No package matching 'tree' is available"
}

$ ansible all --become -m package -a name=nmap
testserver | FAILED! => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "msg": "No package matching 'nmap' is available"
}
```

Mòdul service

Aquest mòdul permet governar serveis, engegar-los, aturar-los, status, show, etc. Per defecte si no s'indica el contrari fa un show.

```
$ ansible all --become -m service -a name=sshd
testserver | SUCCESS => {
  "ansible_facts": {
    "discovered_interpreter_python": "/usr/bin/python3"
  },
  "changed": false,
  "name": "sshd",
  "status": {
    "ActiveEnterTimestamp": "Thu 2023-02-16 15:37:30 UTC",
    "ActiveEnterTimestampMonotonic": "4181592",
    "ActiveExitTimestamp": "Thu 2023-02-16 15:37:30 UTC",
```

Chapter 2. Playbooks: A Beginning

Una mica de YAML i JSON

Strings

```
YAML
Aquest es un string i no cal encapsular, però es pot si es vol

JSON
"Aquest es un string que cal encapsular en JSON"
```

Booleans

```
YAML
true, True, TRUE, yes, Yes, YES, on, On, ON
false, False, FALSE, no, No, NO, off, Off, OFF

JSON
true
false
```

Lists

```
YAML
llibres:
  - Totes les bèsties de carrega
  - Demà a les tres de la matinada
  - Joc brut

YAML
Llibres: [ Totes les bèsties de carrega, Demà a les tres de la matinada, Joc brut ]

JSON
{
  "Llibres": [
    "Totes les bèsties de carrega",
    "Demà a les tres de la matinada",
    "Joc brut"
  ]
}

{
  "shows": [
    "My Fair Lady",
    "Oklahoma",
    "The Pirates of Penzance"
  ]
}
```



```
}
```

Dictionaries

```
YAML
address:
  street: Evergreen Terrace
  appt: '742'
  city: Springfield
  state: North Takoma

YAML
address: { street: Evergreen Terrace, appt: '742', city: Springfield, state: North
Takoma}

JSON
{
  "address": {
    "street": "Evergreen Terrace",
    "appt": 742,
    "city": "Springfield",
    "state": "North Takoma"
  }
}
```

Multi-line strings

```
[ssh_connection]
ssh_args = -o ControlMaster=auto -o ControlPersist=60s -o ForwardAgent=yes
```

```
ansible.cfg
[defaults]
host_key_checking = False
```

```
- name: check out the repository on the host
git: repo={{ repo_url }} dest={{ proj_path }} accept_hostkey=yes
```

```
$ ansible-config init --disabled > ansible.cfg
$ ansible-config init --disabled -t all > ansible.cfg
```

```
[defaults]
```

```
inventory = inventory
remote_user = vagrant
private_key_file = ~/.vagrant.d/insecure_private_key
host_key_checking = False
```

```
ansible_host Default
Name of host Description
Hostname or IP address to SSH to
ansible_port 22 Port to SSH to
ansible_user Root User to SSH as
ansible_password (None) Password to use for SSH authentication
ansible_connection smart How Ansible will connect to host (see the following section)
ansible_private_key_file (None) SSH private key to use for SSH authentication
ansible_shell_type sh Shell to use for commands (see the following section)
ansible_python_interpreter /usr/bin/
python Python interpreter on host (see the following section)
ansible_*_interpreter Like ansible_python_interpreter for other languages (see the
following
section)
```

inventory

```
[web]
web[01:20].example.com

[django:children]
web
task

vagrant1 ansible_host=127.0.0.1 ansible_port=2222

[all:vars]
ntp_server=ntp.ubuntu.com

[vagrant:vars]
db_primary_host=vagrant3
db_primary_port=5432
```

inventory

```
db:
user: widgetuser
password: pFmMxcyD;Fc6)6
name: widget_production
primary:
host: rhodeisland.example.com
port: 5432
replica:
host: virginia.example.com
port: 5432
rabbitmq:
host: pennsylvania.example.com
port: 5672
```

```
- name: Provision a vagrant machine
hosts: localhost
vars:
box: trusty64
tasks:
- name: create a Vagrantfile
command: vagrant init {{ box }} creates=Vagrantfile
- name: Bring up a vagrant machine
command: vagrant up
- name: add the vagrant machine to the inventory
add_host: >
```

```

name=vagrant
ansible_host=127.0.0.1
ansible_port=2222
ansible_user=vagrant
ansible_private_key_file=/Users/lorin/.vagrant.d/
insecure_private_key
- name: Do something to the vagrant machine
hosts: vagrant
become: yes
tasks:
# The list of tasks would go here
- ...

```

Example 3-13. Creating ad hoc groups based on Linux distribution

```

- name: group hosts by distribution
hosts: myhosts
gather_facts: True
tasks:
- name: create groups based on distro
group_by: key={{ ansible_distribution }}
- name: do something to Ubuntu hosts
hosts: Ubuntu
tasks:
- name: install htop
apt: name=htop
# ...
- name: do something else to CentOS hosts
hosts: CentOS
tasks:
- name: install htop
yum: name=htop
# ...

```

vars

```

vars:
key_file: /etc/nginx/ssl/nginx.key
cert_file: /etc/nginx/ssl/nginx.crt
conf_file: /etc/nginx/sites-available/default
server_name: localhost

```

```

vars_files:
- nginx.yml

```

```

- debug: var=myvarname

```

```

- name: capture output of whoami command
command: whoami
register: login

```

```

- name: show return value of command module
hosts: server1
tasks:
- name: capture output of id command
command: id -un
register: login
- debug: var=login

```

```

- name: capture output of id command
command: id -un

```

```
register: login
- debug: msg="Logged in as user {{ login.stdout }}"
```

```
- name: print out operating system
hosts: all
gather_facts: True
tasks:
- debug: var=ansible_distribution
```

```
$ ansible server1 -m setup
```

```
Example 4-9. /etc/ansible/facts.d/example.fact
[book]
title=Ansible: Up and Running
author=Lorin Hochstein
publisher=O'Reilly Media

- name: print ansible_local
debug: var=ansible_local
- name: print book title
debug: msg="The title of the book is {{ ansible_local.example.book.title }}"
```

```
Example 4-10. Using set_fact to simplify variable reference
- name: get snapshot id
shell: >
aws ec2 describe-snapshots --filters
Name=tag:Name,Values=my-snapshot
| jq --raw-output ".Snapshots[].SnapshotId"
register: snap_result
- set_fact: snap={{ snap_result.stdout }}
```

Table 4-1. Built-in variables

Parameter	Description
hostvars	A dict whose keys are Ansible hostnames and values are dicts that map variable names to values
inventory_hostname	Fully qualified domain name of the current host as known by Ansible (e.g., myhost.example.com)
inventory_hostname_short	Name of the current host as known by Ansible, without the domain name (e.g., myhost)
group_names	A list of all groups that the current host is a member of
groups	A dict whose keys are Ansible group names and values are a list of hostnames that are members of the group. Includes all and ungrouped groups: {"all": [...], "web": [...], "ungrouped": [...]}
ansible_check_mode	A boolean that is true when running in check mode (see "Check Mode" on page 313)
ansible_play_batch	A list of the inventory hostnames that are active in the current batch (see "Running on a Batch of Hosts at a Time" on page 175)
ansible_play_hosts	A list of all of the inventory hostnames that are active in the current play
ansible_version	A dict with Ansible version info: {"full": "2.3.1.0", "major": 2, "minor": 3, "revision": 1, "string": "2.3.1.0"}

```
Example 4-11. Setting a variable from the command line
$ ansible-playbook example.yml -e token=12345
```

```
- name: pass a message on the command line
```

```
hosts: localhost
vars:
greeting: "you didn't specify a message"
tasks:
- name: output a message
debug: msg="{{ greeting }}"
If we invoke it like this:
$ ansible-playbook greet.yml -e greeting=hiya
```