Ansible: Getting Started in a Jupyter Notebook

A Jupyter Notebook to follow along while reading "Ansible: Up and Running", 2nd Edition,
Lorin Hochstein, Rene Moser
http://shop.oreilly.com/product/0636920065500.do (http://shop.oreilly.com/product/0636920065500.do)
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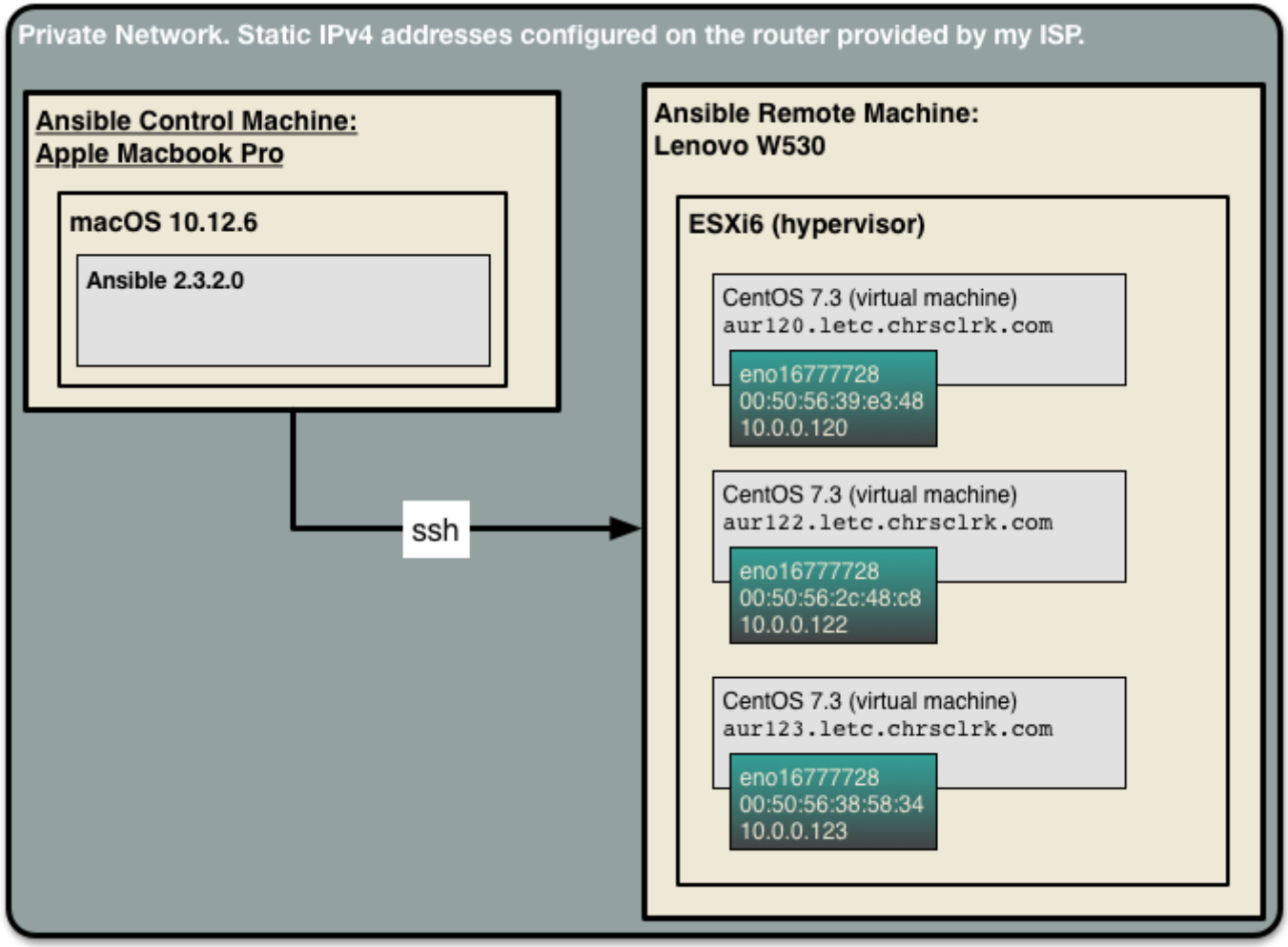
Remote machines of interest to the control machine:



Ansible Control Machine: what is the execution context?

`subprocess.check_output()` from page 546
"Python Cookbook" 3rd Edition, David Beazley and Brian K. Jones, 2013,
O'Reily media, ISBN 978-1-4493-4037-7, http://www.dabeaz.com/cookbook.html (http://www.dabeaz.com/cookbook.html)

In [1]:
```
import sys, platform, subprocess
ansibleVersion = subprocess.check_output(['ansible', '--version']).decode('utf-8').split()[1]
print(   f" Python:  {' '.join(sys.version.split()[0:4])}\n"  # Not the version of Pythone used by Ansib
         f'  macOS:  {platform.mac_ver()[0]}\n'               # Control machine operatings sysrtem.
         f"Ansible:  {subprocess.check_output(['ansible', '--version']).decode('utf-8').split()[1]}")
```

```
 Python:  3.6.0 |Anaconda custom (x86_64)|
  macOS:  10.12.6
Ansible:  2.3.2.0
```

View of the network, private, from /etc/hosts

(/etc/hosts display truncated to avoid line wrap)

In [2]:
```
! nl -b a /etc/hosts | sed -n '74,77p;84,86p' | cut -c 1-100
```

```
    74  # 31Aug17R letc strata 13 aur “Ansible Up and Running” examples, hm17
    75  #---+---10----+---20----+---30----+---40----+---50----+---60----+---70----+---80----+---90---
    76  # IPv4           hostname FQDN                       hstnm short   alias   comment
    77  #--------------  -------------------------------  ------------  ------  -------------------
    84       10.0.0.123           aur123.letc.chrsclrk.com  aur123        j123    # 31Aug17R ESXi MAC
    85       10.0.0.122           aur122.letc.chrsclrk.com  aur122        j122    # 31Aug17R ESXi MAC
    86       10.0.0.121           aur121.letc.chrsclrk.com  aur121        j121    # 31Aug17R ESXi MAC
```

Review of control machine's Ansible configuration

Let the Jupyter notebook know where to find files.

In [3]:
```
%cd '/Users/chrsclrk/Google Drive/solutionArchitect/automation'
```

```
/Users/chrsclrk/Google Drive/solutionArchitect/automation
```

Note use of group "aur" to provide value for "become" password.

In [4]:
```
! echo "*** inventory.ini contents ***" ; nl -ba controlMachine/inventory.ini | sed -n '1,7p'
```

```
*** inventory.ini contents ***
     1  [aur]
     2  j120  ansible_host=aur120.letc.chrsclrk.com  ansible_port=22  ansible_user=virtuser
     3  j122  ansible_host=aur122.letc.chrsclrk.com  ansible_port=22  ansible_user=virtuser
     4  j123  ansible_host=aur123.letc.chrsclrk.com  ansible_port=22  ansible_user=virtuser
     5
     6  [aur:vars]
     7  # ansible_become_pass=<password vault is a better approach>
```

In [5]:
```
! echo "*** ansible.cfg contents ***" ; cat /Users/chrsclrk/.ansible.cfg
```

```
*** ansible.cfg contents ***
[defaults]
private_key_file=/Users/chrsclrk/.ssh/c6k
host_key_checking = False
# From http://ansible-docs.readthedocs.io/zh/stable-2.0/rst/intro_configuration.html#ansible-managed
(http://ansible-docs.readthedocs.io/zh/stable-2.0/rst/intro_configuration.html#ansible-managed)
ansible_managed = Ansible ma:wnaged: {file:} modified on %Y-%m-%d %H:%M:%S by {uid} on {host}
```

is the control machine able to reach the remote machines?

Ansilble module, ping, replies with the string "ping" the control machine successfully connects with the host in the group aur.

In [6]:
```
!ansible aur --inventory=controlMachine/inventory.ini --module-name=ping
```

```
j120 | SUCCESS => {
    "changed": false,
    "ping": "pong"
}
j123 | SUCCESS => {
    "changed": false,
    "ping": "pong"
}
j122 | SUCCESS => {
    "changed": false,
    "ping": "pong"
}
```

Here Ansible runs a program on the remote machines.

- connectivity is established
- uptime for the remote machines may be of interest than the string "pong".

In [7]:
```
!ansible aur --inventory=controlMachine/inventory.ini --module-name=command --args=uptime
```

```
j122 | SUCCESS | rc=0 >>
 17:58:49 up 6 days,  1:07,  1 user,  load average: 0.00, 0.01, 0.05

j120 | SUCCESS | rc=0 >>
 17:58:49 up 11 days,  1:43,  1 user,  load average: 0.00, 0.01, 0.05

j123 | SUCCESS | rc=0 >>
 17:58:49 up 10 days, 21:49,  1 user,  load average: 0.03, 0.02, 0.05
```

Ansible's "setup" module; all it knows about a target machine

When Ansible's connects to a target machine it collects information as part of its setup.
The resulting data structure is collectively referred to as facts.

In [8]:
```
oneSetup = !ansible aur[0] --inventory=controlMachine/inventory.ini --module-name=setup
print(f'{len(oneSetup):>34}  Metric of setup results; length of Jupyter reference to saved setup results
      f'{type(oneSetup)}  Type of Jupyter reference to save results.')
```

```
                                 433  Metric of setup results; length of Jupyter reference to saved setu
p results.
<class 'IPython.utils.text.SList'>  Type of Jupyter reference to save results.
```

In [9]:
```
oneSetup  # View facts from the first target machine.
```

Out[9]:
```
['j120 | SUCCESS => {',
 '    "ansible_facts": {',
 '        "ansible_all_ipv4_addresses": [',
 '            "10.0.0.120"',
 '        ], ',
 '        "ansible_all_ipv6_addresses": [',
 '            "2601:240:8001:d6c0::18", ',
 '            "2601:240:8001:d6c0:250:56ff:fe39:e348", ',
 '            "fe80::250:56ff:fe39:e348"',
 '        ], ',
 '        "ansible_apparmor": {',
 '            "status": "disabled"',
 '        }, ',
 '        "ansible_architecture": "x86_64", ',
 '        "ansible_bios_date": "09/21/2015", ',
 '        "ansible_bios_version": "6.00", ',
 '        "ansible_cmdline": {',
 '            "BOOT_IMAGE": "/vmlinuz-3.10.0-327.el7.x86_64", ',
 '            "LANG": "en_US.UTF-8", ',
 '            "crashkernel": "auto", '
```

Retrieve a subset of the facts.

From Loren Hochsetein's page
[https://github.com/lorin/ansible-quickref/blob/master/facts.rst (https://github.com/lorin/ansible-quickref/blob/master/facts.rst)]

In [10]:
```
!ansible aur --inventory=controlMachine/inventory.ini --module-name=setup --args='filter=ansible_default
```

```
j120 | SUCCESS => {
    "ansible_facts": {
        "ansible_default_ipv4": {
            "address": "10.0.0.120",
            "alias": "eno16777728",
            "broadcast": "10.0.0.255",
            "gateway": "10.0.0.1",
            "interface": "eno16777728",
            "macaddress": "00:50:56:39:e3:48",
            "mtu": 1500,
            "netmask": "255.255.255.0",
            "network": "10.0.0.0",
            "type": "ether"
        }
    },
    "changed": false
}
j123 | SUCCESS => {
    "ansible_facts": {
        "ansible_default_ipv4": {
            "address": "10.0.0.123",
            "alias": "eno16777728",
            "broadcast": "10.0.0.255",
            "gateway": "10.0.0.1",
            "interface": "eno16777728",
            "macaddress": "00:50:56:38:58:34",
            "mtu": 1500,
            "netmask": "255.255.255.0",
            "network": "10.0.0.0",
            "type": "ether"
        }
    },
    "changed": false
}
j122 | SUCCESS => {
    "ansible_facts": {
        "ansible_default_ipv4": {
            "address": "10.0.0.122",
            "alias": "eno16777728",
            "broadcast": "10.0.0.255",
            "gateway": "10.0.0.1",
```

```
            "interface": "eno16777728",
            "macaddress": "00:50:56:2c:48:c8",
            "mtu": 1500,
            "netmask": "255.255.255.0",
            "network": "10.0.0.0",
            "type": "ether"
        }
    },
    "changed": false
}
```

Report the target machines' date for rough idea of time synchrony.

From the control machine, Ansible concurrently accesses the target machines.
This example shows the three target machines are within a 100 milliseconds of each other.

In [11]:
```
!ansible aur --inventory=controlMachine/inventory.ini --module-name=shell --args="date --rfc-3339=ns
```

```
j122 | SUCCESS | rc=0 >>
2017-09-11 17:59:25.762228702+00:00

j120 | SUCCESS | rc=0 >>
2017-09-11 17:59:25.772023752+00:00

j123 | SUCCESS | rc=0 >>
2017-09-11 17:59:25.791579559+00:00
```

Results from piping commands on the remote machines.

Three commands on the target host to yield an IPv4 address of a network device.
(CentOS uses the "Predictable Network Interface Names (https://www.freedesktop.org/wiki/Software/systemd/PredictableNetworkInterfaceNames/)" convention.)

In [12]:
```
!ansible aur --inventory=controlMachine/inventory.ini --module-name=shell --args="/usr/sbin/ip -4 add
```

```
j120 | SUCCESS | rc=0 >>
10.0.0.120/24

j122 | SUCCESS | rc=0 >>
10.0.0.122/24

j123 | SUCCESS | rc=0 >>
10.0.0.123/24
```

Ansible Playbooks

One playbook with one task and three debug statments concerning the network adapater Ansible is using by default."
Ansible's `debug` module is used to

- print the IPv4 address
- print the MAC address
- print the IPv4 and MAC address togehter on one line

In [13]:
```
! nl playbooks/ch04-98_facts_ip-mac.yaml
```

```
     1  - name: For the default IPv4 adpater, show IP separate from MAC, then IPv4 and MAC on the same
line.
     2    hosts: aur
     3    gather_facts: True
     4    tasks:
     5      - debug: var=ansible_default_ipv4.address
     6      - debug: var=ansible_default_ipv4.macaddress
     7      - debug: msg=" ip:mac {{ ansible_default_ipv4.address }} ':' {{ ansible_default_ipv4.macad
dress }}"
```

In [14]:
```
! ansible-playbook --verbose --inventory=controlMachine/inventory.ini --become playbooks/ch04-98_facts_i
```

```
Using /Users/chrsclrk/.ansible.cfg as config file

PLAY [For the default IPv4 adpater, show IP separate from MAC, then IPv4 and MAC on the same line.] **
*

TASK [Gathering Facts] *********************************************************
ok: [j120]
ok: [j122]
ok: [j123]

TASK [debug] *******************************************************************
ok: [j120] => {
    "ansible_default_ipv4.address": "10.0.0.120"
}
ok: [j122] => {
    "ansible_default_ipv4.address": "10.0.0.122"
}
ok: [j123] => {
    "ansible_default_ipv4.address": "10.0.0.123"
}

TASK [debug] *******************************************************************
ok: [j120] => {
    "ansible_default_ipv4.macaddress": "00:50:56:39:e3:48"
}
ok: [j122] => {
    "ansible_default_ipv4.macaddress": "00:50:56:2c:48:c8"
}
ok: [j123] => {
    "ansible_default_ipv4.macaddress": "00:50:56:38:58:34"
}

TASK [debug] *******************************************************************
ok: [j120] => {
    "msg": " ip:mac 10.0.0.120 ':' 00:50:56:39:e3:48"
}
ok: [j122] => {
    "msg": " ip:mac 10.0.0.122 ':' 00:50:56:2c:48:c8"
}
ok: [j123] => {
    "msg": " ip:mac 10.0.0.123 ':' 00:50:56:38:58:34"
```

```
}

PLAY RECAP *********************************************************************
j120                       : ok=4    changed=0    unreachable=0    failed=0
j122                       : ok=4    changed=0    unreachable=0    failed=0
j123                       : ok=4    changed=0    unreachable=0    failed=0
```

In [ ]: