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How to Setup Your Own Malware Analysis Box – Cuckoo Sandbox

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November 16, 2022 < https://beginninghacking.net/2022/11/16/how-to-setup-your-own-malware-analysis-box-cuckoo-sandbox/>
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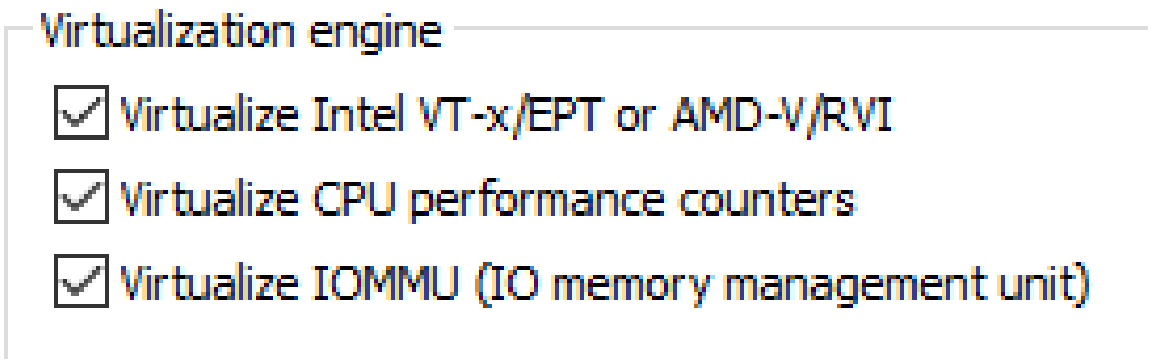
I am writing this blog entry because I know I was not the only one who had trouble setting up my own malware analysis box – Cuckoo. I have tried many tutorials, both written and video recorded, and I could never make it work. Finally, I decided to work on it until I came up with the process that successfully deployed Cuckoo for me. This is me putting things together from different sources. I hope someone will find this entry helpful.

I am also a visual learner, so in addition to the text commands, I've also included screenshots of each step I took:

Requirements:

- Ubuntu 18.04 < https://releases.ubuntu.com/18.04/ubuntu-18.04.6-desktop-amd64.iso> – This is your Guest OS in VMWare Workstation
- Windows 7 < http://cuckoo.sh/win7ultimate.iso> – This is your Guest OS in VirtualBox inside the Ubuntu Guest OS

- Enable virtualization within VMWare in Ubuntu VM:



Steps:

1. Update Ubuntu box:
   - ***sudo apt-get update***

```
jonald@cuckoo-demo:~$ sudo apt-get update
Get:1 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Hit:2 http://us.archive.ubuntu.com/ubuntu bionic InRelease
Get:3 http://us.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu bionic-backports InRelease [83.3 kB]
Fetched 261 kB in 1s (416 kB/s)
Reading package lists... Done
```

2. Install required packages and apt repositories:
   - ***sudo apt-get -y install python python-pip python-dev libffi-dev libssl-dev***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install python python-pip python-dev libffi-dev libssl-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

   - ***sudo apt-get -y install python-virtualenv python-setuptools***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install python-virtualenv python-setuptools
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

   - ***sudo apt-get -y install libjpeg-dev zlib1g-dev swig***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install libjpeg-dev zlib1g-dev swig
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

3. Install MongoDB:

- ***sudo apt-get -y install mongodb***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install mongodb
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

4. Install PostgreSQL:

- ***sudo apt-get -y install postgresql libpq-dev***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install postgresql libpq-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

5. Install VirtualBox:

- ***sudo apt-get -y install virtualbox***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install virtualbox
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

6. Install tcpdump AppArmor:

- ***sudo apt-get -y install tcpdump apparmor-utils***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install tcpdump apparmor-utils
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

- ***sudo aa-disable /usr/sbin/tcpdump***

```
jonald@cuckoo-demo:~$ sudo aa-disable /usr/sbin/tcpdump
Disabling /usr/sbin/tcpdump.
```

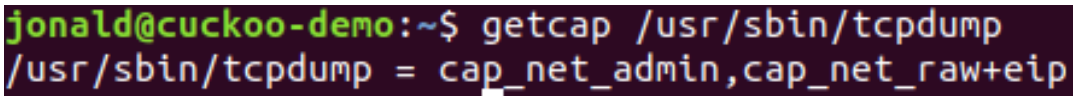
7. Add a new group and add a user so you don't have to run as root:

- ***sudo adduser –disabled-password –gecos “” jonaldtest***

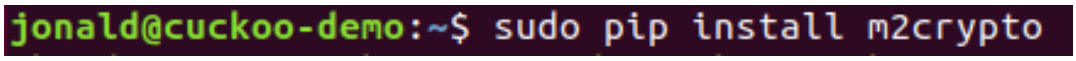
```
jonald@cuckoo-demo:~$ sudo adduser --disabled-password --gecos "" jonaldtest
Adding user `jonaldtest' ...
Adding new group `jonaldtest' (1001) ...
Adding new user `jonaldtest' (1001) with group `jonaldtest' ...
Creating home directory `/home/jonaldtest' ...
Copying files from `/etc/skel' ...
```

- ***sudo groupadd pcap***
- ***sudo usermod -a -G pcap jonaldtest***
- ***sudo chgrp pcap /usr/sbin/tcpdump***
- ***sudo setcap cap_net_raw,cap_net_admin=eip /usr/sbin/tcpdump***

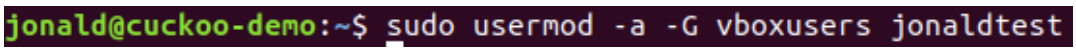
8. Verify the last command:
    - ***getcap /usr/sbin/tcpdump***



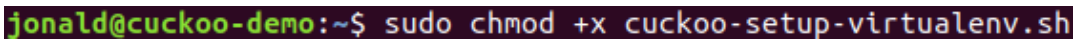
9. Install M2Crypto:
    - ***sudo pip install m2crypto***



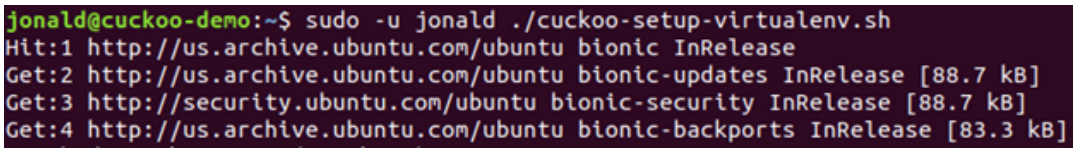
10. Add the account you created in step 7 to vboxusers group:
    - ***sudo usermod -a -G vboxusers jonaldtest***



11. Create a virtual environment by using a script. Save the script as **cuckoo-setup-virtualenv.sh** (Shoutout to Josh Stroschein for the code) You can download the script at the end of this post:
12. Change the permission of the script:
    - ***sudo chmod +x cuckoo-setup-virtualenv.sh***

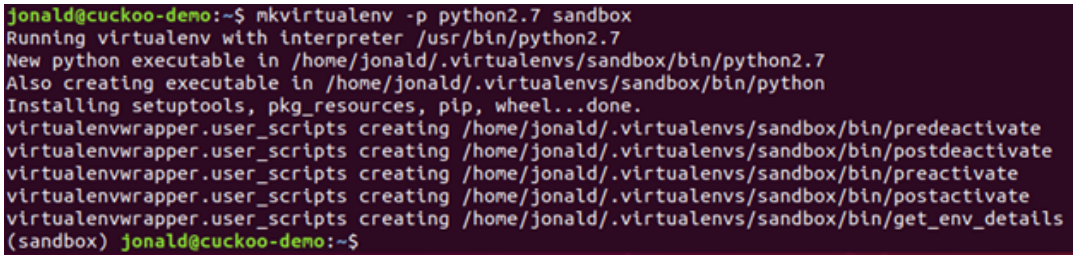


13. Run the script using your current logged-in user and not the one you created in step 7:
    - ***sudo -u jonald ./cuckoo-setup-virtualenv.sh***

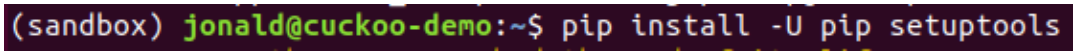


14. Update your current shell environment:
    - ***source ~/.bashrc***

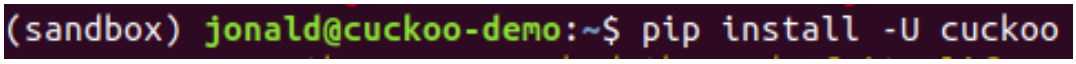
15. Create a virtual environment. You can name your virtual environment anything you want, I am using sandbox:
    - ***mkvirtualenv -p python2.7 sandbox***



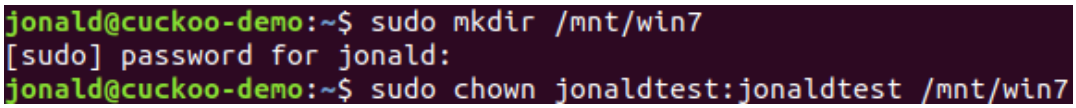
16. Setup and install cuckoo while you are inside your newly created virtual env (sandbox):
    - ***pip install -U pip setuptools***



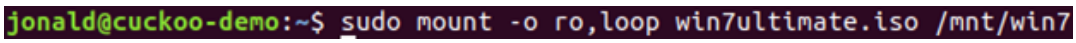
    - ***pip install -U cuckoo***



17. Create a directory to mount Windows 7 iso (open a new terminal):
    - ***sudo mkdir /mnt/win7***
    - ***sudo chown jonaldtest:jonaldtest /mnt/win7***



    - ***sudo mount -o ro,loop win7ultimate.iso /mnt/win7***



18. Install packages again just to make sure that there are no missing packages after everything that we have installed so far:
    - ***sudo apt-get -y install build-essential libssl-dev libffi-dev python-dev genisoimage***
    - ***sudo apt-get -y install zlib1g-dev libjpeg-dev***
    - ***sudo apt-get -y install python-pip python-virtualenv python-setuptools swig***

```
jonald@cuckoo-demo:~$ sudo apt-get -y install build-essential libssl-dev libffi-dev python-dev genisoimage
Reading package lists... Done
Building dependency tree
Reading state information... Done
build-essential is already the newest version (12.4ubuntu1).
build-essential set to manually installed.
genisoimage is already the newest version (9:1.1.11-3ubuntu2).
libffi-dev is already the newest version (3.2.1-8).
python-dev is already the newest version (2.7.15~rc1-1).
libssl-dev is already the newest version (1.1.1-1ubuntu2.1~18.04.20).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
jonald@cuckoo-demo:~$ sudo apt-get -y install zlib1g-dev libjpeg-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
libjpeg-dev is already the newest version (8c-2ubuntu8).
zlib1g-dev is already the newest version (1:1.2.11.dfsg-0ubuntu2.2).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
jonald@cuckoo-demo:~$ sudo apt-get -y install python-pip python-virtualenv python-setuptools swig
Reading package lists... Done
Building dependency tree
Reading state information... Done
python-setuptools is already the newest version (39.0.1-2).
python-virtualenv is already the newest version (15.1.0+ds-1.1).
swig is already the newest version (3.0.12-1).
python-pip is already the newest version (9.0.1-2.3~ubuntu1.18.04.5).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

19. Install vmcloak and run it (inside the virtual environment):
    - ***pip install -U vmcloak***

      ```
      (sandbox) jonald@cuckoo-demo:~$ pip install -U vmcloak
      ```

    - ***vmcloak***

20. Create a HOST-ONLY network adapter using vmcloak:
    - ***vmcloak-vboxnet0***

      ```
      (sandbox) jonald@cuckoo-demo:~$ vmcloak-vboxnet0
      0%...10%...20%...30%...40%...50%...60%...70%...80%...90%...100%
      Interface 'vboxnet0' was successfully created
      ```

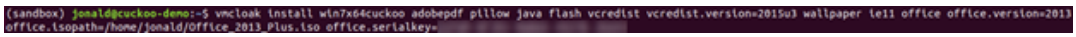
21. Setup Windows VM (this takes between 45 – 60 minutes):
    - ***vmcloak init –verbose –win7x64 win7x64base –cpus 2 –ramsize 2048***

22. Clone the Windows VM:
    - ***vmcloak clone win7x64base win7x64cuckoo***

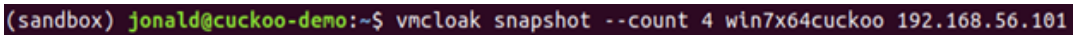
      ```
      (sandbox) jonald@cuckoo-demo:~$ vmcloak clone win7x64base win7x64cuckoo
      ```

23. Install some basic software packages:
    - ***vmcloak install win7x64cuckoo adobepdf pillow java flash vcredist vcredist.version=2015u3 wallpaper ie11 office office.version=2013 office.isopath=/home/jonald/Office_2013_Plus.iso***

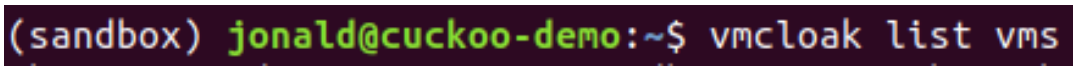
office.serialkey= XXXXX-XXXXX-XXXXX-XXXXX-XXXXX



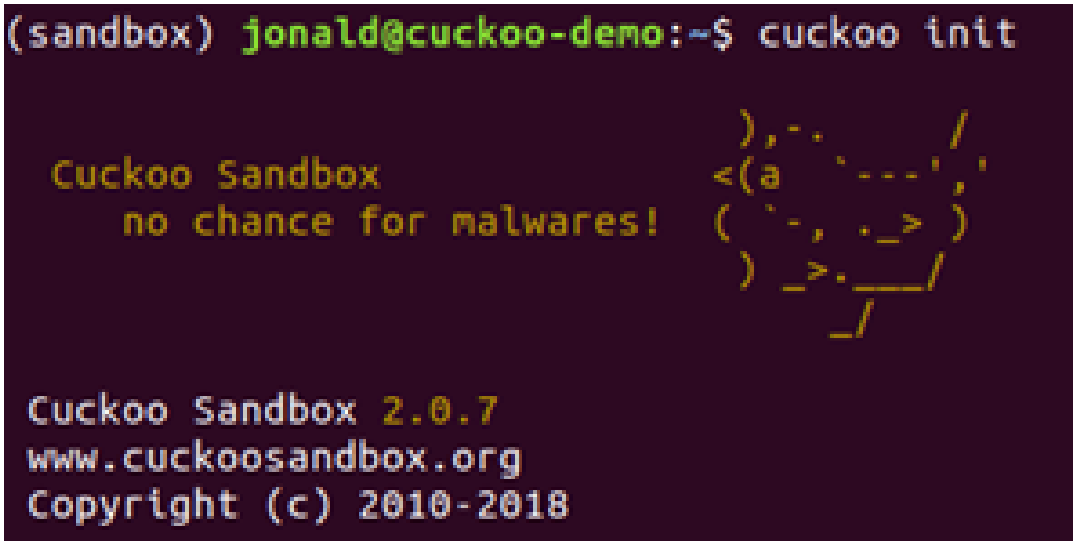
24. Create the Windows VMs:
    - ***vmcloak snapshot –count 4 win7x64cuckoo 192.168.56.101***



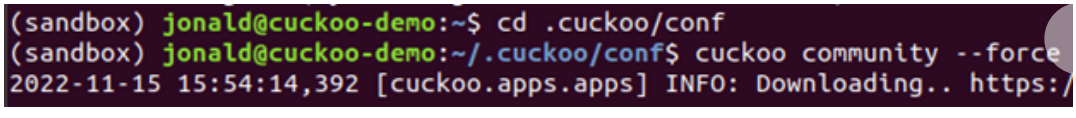
25. View the list of VMs:
    - ***vmcloak list vms***



26. Create the cuckoo directory where all config files get saved (still inside the virtual environment):
    - ***cuckoo init***

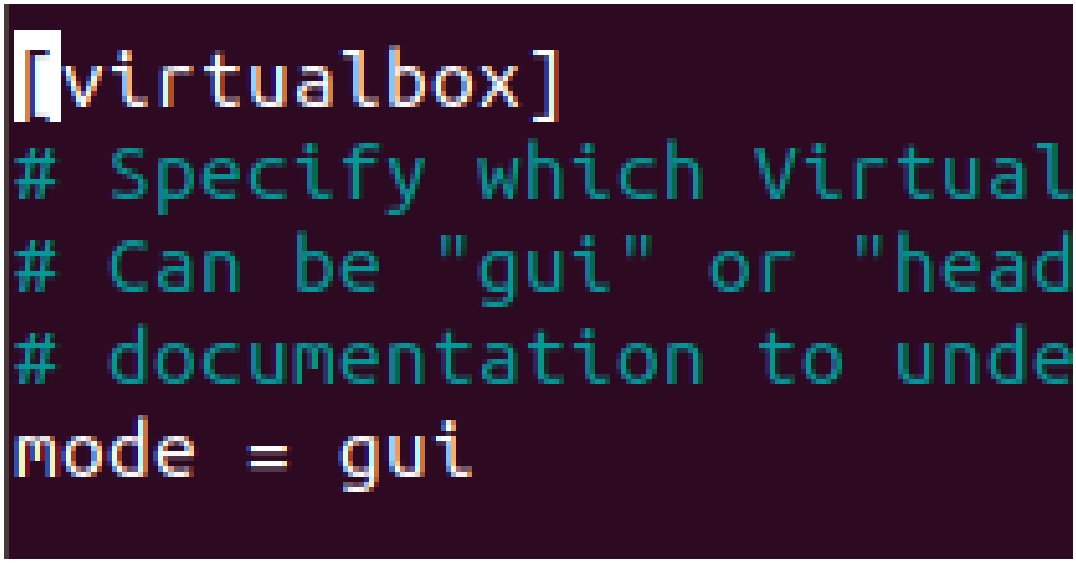


27. Update cuckoo to the latest signature (you have to do this regularly so the signature gets updated with the current known threats signature):
    - ***cd .cuckoo/conf***
    - ***cuckoo community –force***

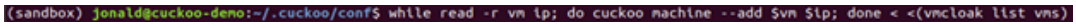


28. Open .cuckoo/conf/virtualbox.conf and change the **MODE** to GUI:
    - ***nano virtualbox.conf***
    - ***mode = gui (from headless)***

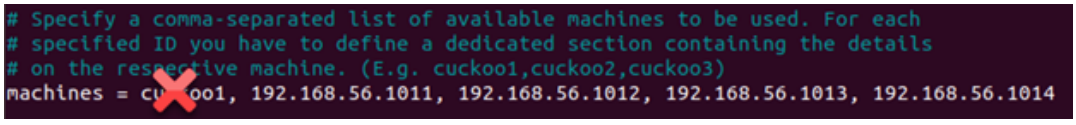
- ***save the change***

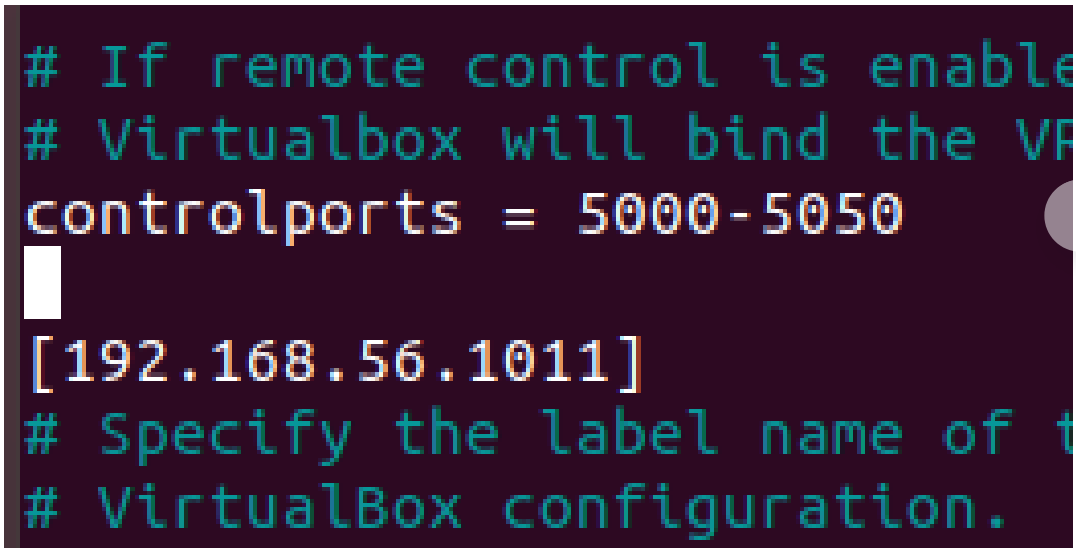


29. Copy and paste the below command to add the 4 VMs we created to the conf file:
    - ***while read -r vm ip; do cuckoo machine –add $vm $ip; done < <(vmcloak list vms)***

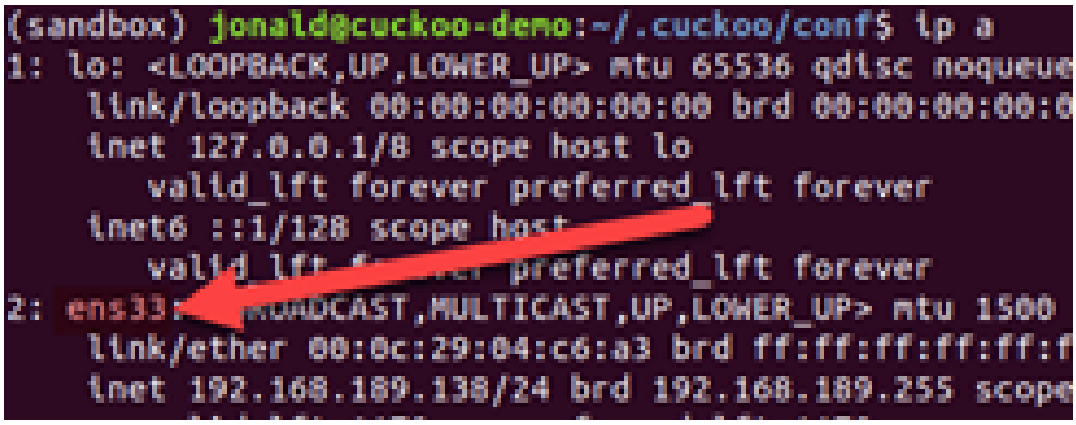


30. Open **virtualbox.conf** again, remove **cuckoo1** under machines, delete everything after **controlports** and stop when you see the first IP address that matches the IP under machines:
    - ***Delete cuckoo1***

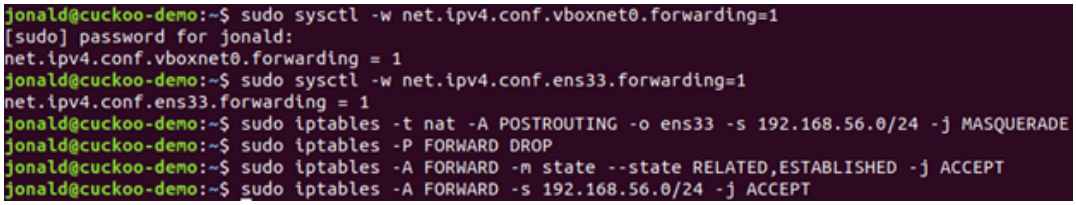




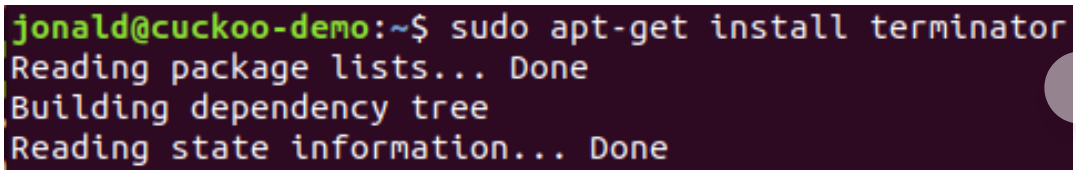
31. Check your network adapter for the next setup steps:
    - ***ip a***



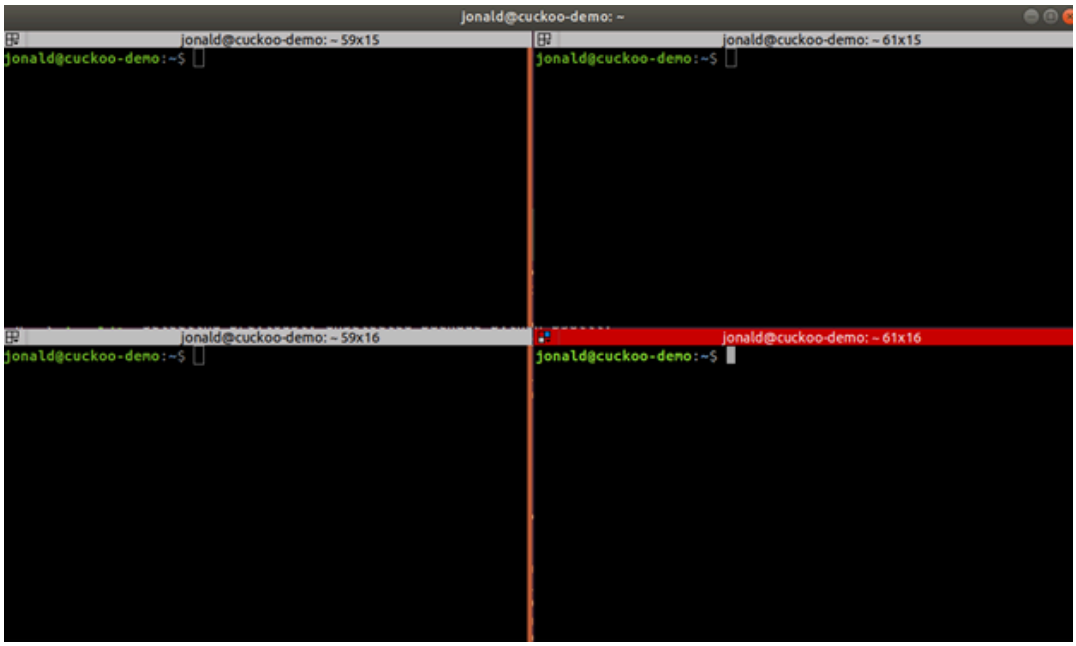
32. Run the following commands inside of the virtual environment:
    - ***sudo sysctl -w net.ipv4.conf.vboxnet0.forwarding=1***
    - ***sudo sysctl -w net.ipv4.conf.ens33.forwarding=1***
    - ***sudo iptables -t nat -A POSTROUTING -o ens33 -s 192.168.56.0/24 -j MASQUERADE***
    - ***sudo iptables -P FORWARD DROP***
    - ***sudo iptables -A FORWARD -m state –state RELATED,ESTABLISHED -j ACCEPT***
    - ***sudo iptables -A FORWARD -s 192.168.56.0/24 -j ACCEPT***



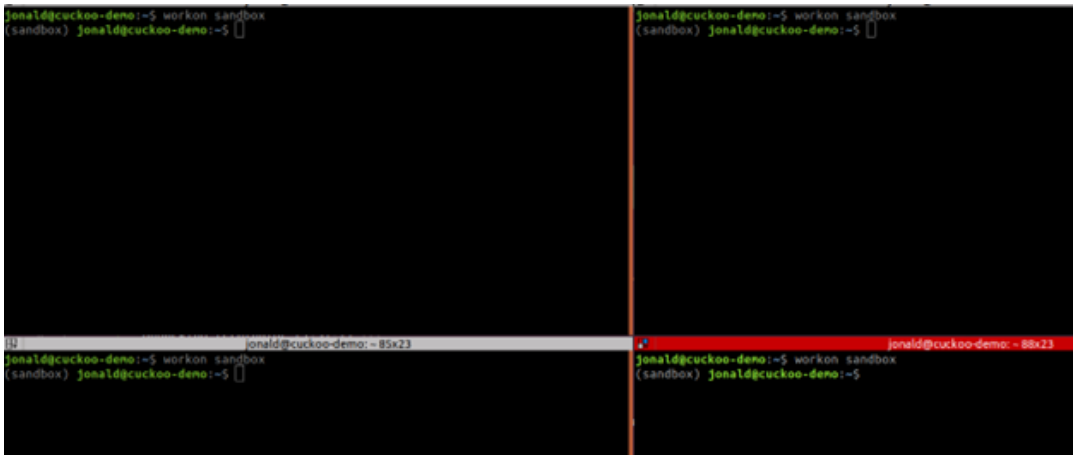
33. OPTIONAL: Install terminator:
    - ***sudo apt-get install terminator***



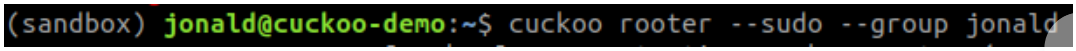
34. Open Terminator and split it to four windows:
    - Split to 4 windows



35. Enter the virtual environment in all terminals:
    - ***workon sandbox***

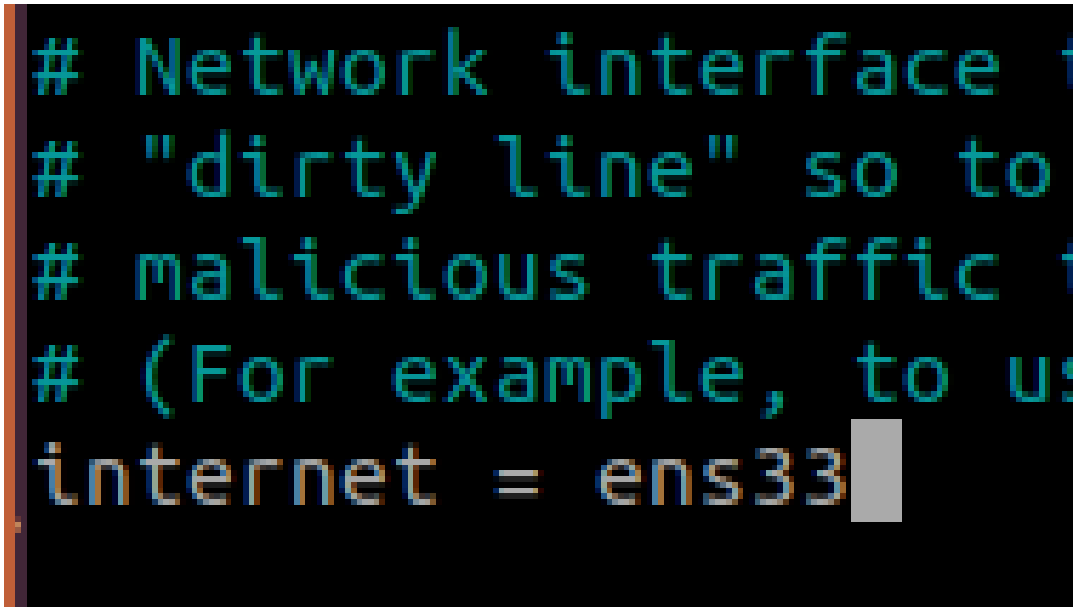


36. (Terminator window 1) type:
    - ***cuckoo rooter –sudo –group jonald***

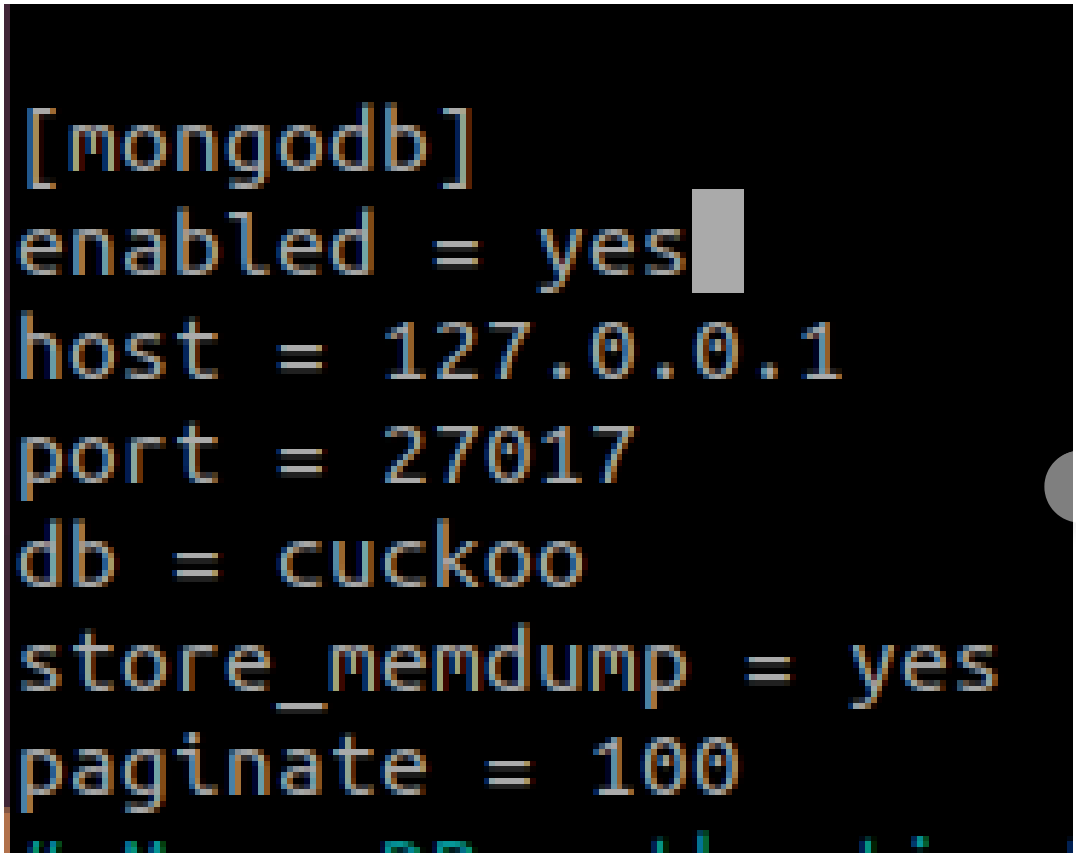


    - Leave terminal window 1 running

37. Change the routing information. Open **routing.conf** and change the **internet** entry to your network adapter (ens33):
    - ***internet = ens33***

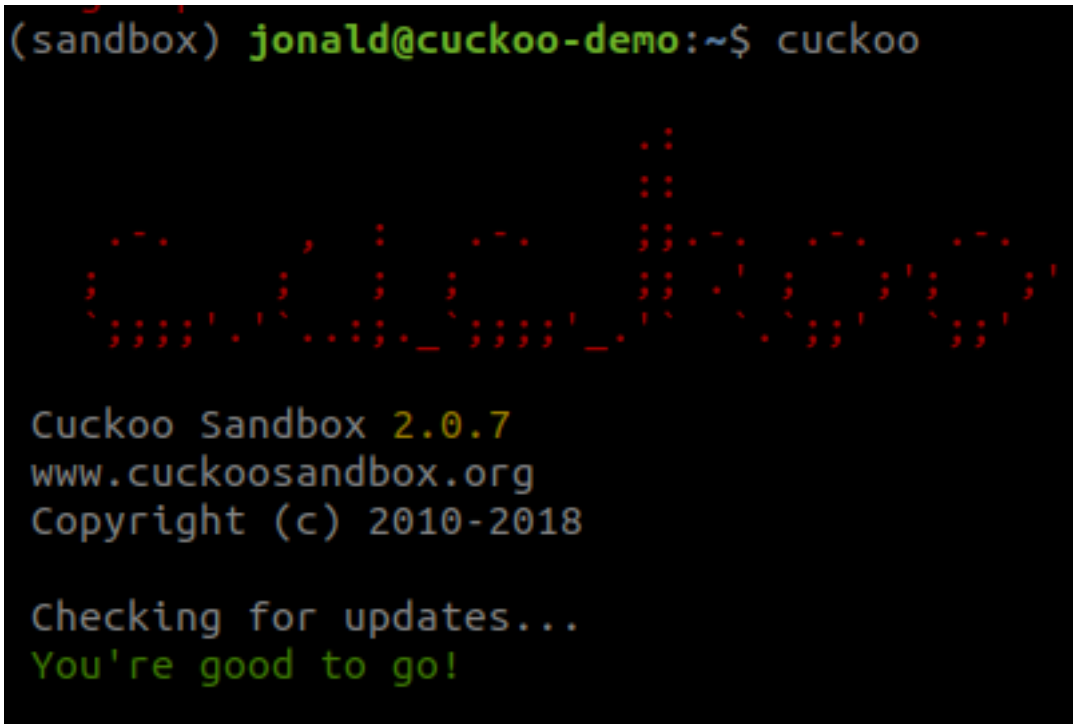


    - save the file
38. Change the reporting information. Open **reporting.conf** and change the **MongoDB** entry to yes:
    - ***enabled = yes***



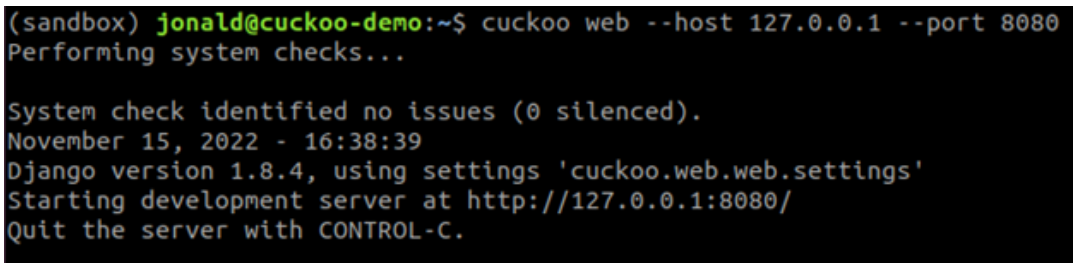
- save the file

39. Do not touch the first window with command “cuckoo rooter –sudo –group jonald”. Go to another and start **cuckoo**:
    - ***cuckoo***



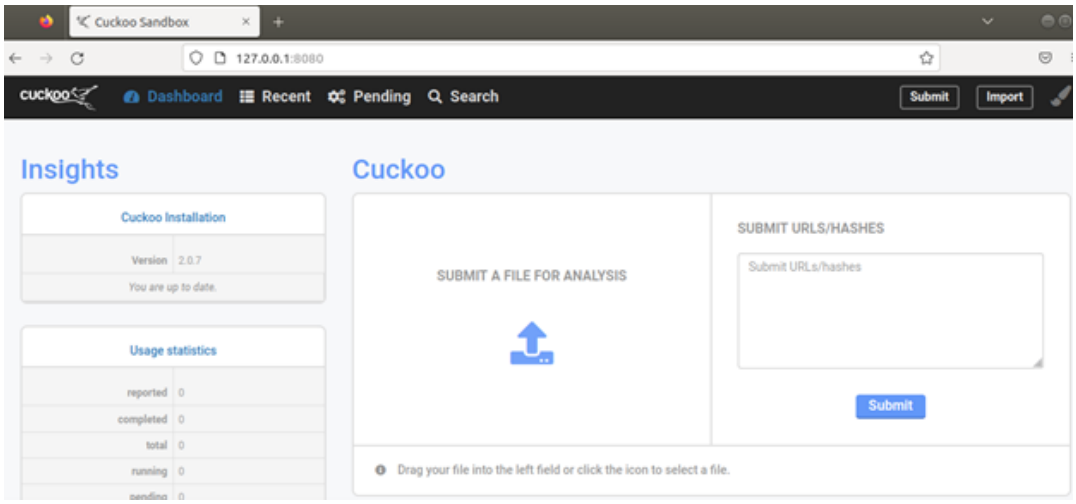
    - Leave terminal window 2 running

40. In a third terminal, start the cuckoo web server:
    - ***cuckoo web –host 127.0.0.1 –port 8080***

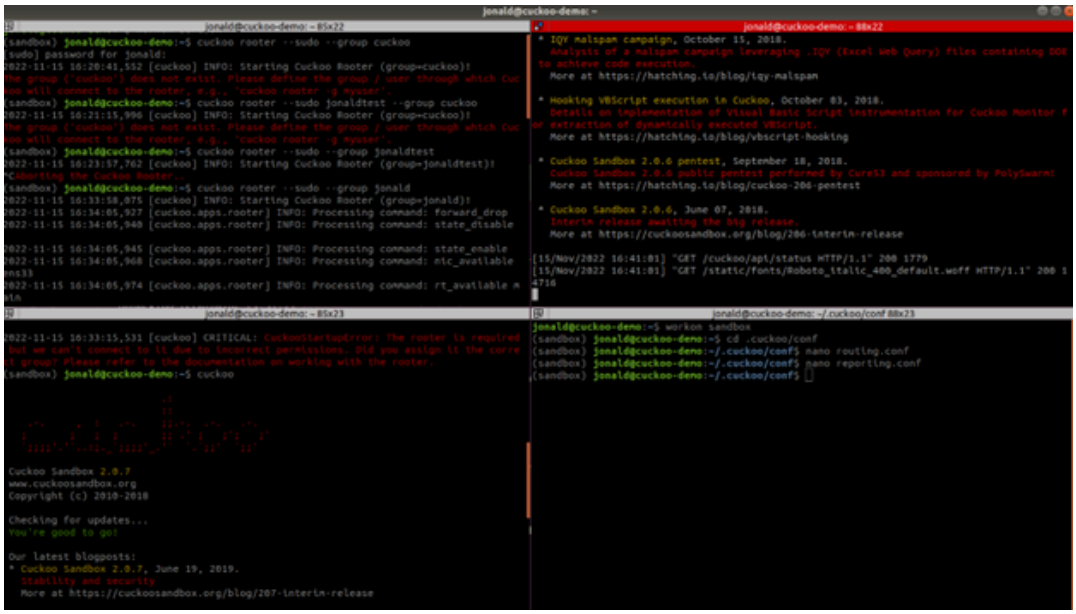


    - Leave terminal window 3 running

41. Open a web browser to access the cuckoo web interface:
    - ***http://127.0.0.1:8080 < http://127.0.0.1:8080>***



42. This is how your Terminator should look like while using cuckoo sandbox:
    - Terminator



    - Don’t forget to take a snapshot of your Ubuntu VM. I would recommend reverting to a snapshot after a verified malicious file analysis. You don’t want to take the risk of an 0-day VM escape vulnerability. Haha

I hope you find this helpful. If you haven’t subscribed here, please do so.

Below is the script I used in step 11.

```
#!/usr/bin/env bash

# Author: Josh Stroschein
# Source: https://askubuntu.com/questions/244641/how-to-set-up-and-use-a-virtual-python-environment-in-ubuntu
# NOTES: Run this script as: sudo -u <USERNAME> cuckoo-setup-virtualenv.sh
#        Additionally, your environment may not allow the script to source bashrc and you may need to do this manually after the script completes

# install virtualenv
sudo apt-get update && sudo apt-get -y install virtualenv

# install virtualenvwrapper
sudo apt-get -y install virtualenvwrapper

echo "source /usr/share/virtualenvwrapper/virtualenvwrapper.sh" >> ~/.bashrc

# install pip for python3
sudo apt-get -y install python3-pip

# turn on bash auto-complete for pip
pip3 completion --bash >> ~/.bashrc

# avoid installing with root
```

```
pip3 install --user virtualenvwrapper

echo "export
VIRTUALENVWRAPPER_PYTHON=/usr/bin/python3" >>
~/.bashrc

echo "source ~/.local/bin/virtualenvwrapper.sh" >>
~/.bashrc

export WORKON_HOME=~/.virtualenvs

echo "export WORKON_HOME=~/.virtualenvs" >> ~/.bashrc

echo "export PIP_VIRTUALENV_BASE=~/.virtualenvs" >>
~/.bashrc

source ~/.bashrc
```

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2 Comments

jdmorto

November 16, 2022 at 4:21 pm < https://beginninghacking.net/2022/11/16/how-to-setup-your-own-malware-analysis-box-cuckoo-sandbox/#comment-58>

This will be so helpful and come in handy. Thank you!

★< https://beginninghacking.net/2022/11/16/how-to-setup-your-own-malware-analysis-box-cuckoo-sandbox/?like_comment=58&_wpnonce=b99dde5ea4>
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