Lab Environment setup- On your own Machine

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PLEASE READ THIS SECTION CAREFULLY BEFORE YOU START

- For this module we will be using two different virtual machines. You can setup the lab environment either on your own device or using a lab machine.
- **On your own device go to section 1**: You will need to complete this lab only once.
- **Once you complete the VM machines setup in section 2 you need to read the network connectivity section. Go to section 3**
- **If you are having a problem, go to section 4. If this is still not working, please check with your lab instructor.**

1 Setting up the lab environment

- You will need to download the two Virtual Machines we use for this module:
  (1) **OWASP_Broken_Web_Apps_1.2.7z**: This is OAWSP VM, the vulnerable machine that contains all the different services (Apache, databases,web apps, etc..).
  (2) **kali-linux-2023.2A-UoW-VBox-amd64.7z**: This is Kali Linux VM, the attacker or the penetration tester will be using this. It contains several pre-installed tools that hackers and penetration testers use.
  - To download them, please choose from below:
    1. **If you are working from home on your own machine:**
       * **Access from the ECS download page**
         https://download.ecs.westminster.ac.uk/VirtualMachines/
    2. **If you are working on your own machine when connected to Eduroam**
       http://10.20.144.78/download/VMs/SecurityVMs/
  - Download the relevant VMs by right clicking save them anywhere you want. (maybe create a folder called VMs on your C drive, or D drive, or anywhere you have enough space)
  - You will need to install 7-zip software. You can download it from here: https://www.7-zip.org/download.html
    (1) For this module, we will need a virtual machines manager application . There are many choices of Virtualisation software you can use.
    (2) Oracle Virtual Box is the virtualisation software that we will be using in this module.
    * If you are using your own machine You can download Oracle Virtual box from this link
      · You need to make sure you are downloading the correct version - **depending on your host Operating system**. Once the download is finished, you should install it.

2 Setting up VirtualBox

(1) Now we have everything we need, both on your machine or in the lab, we will use Oracle Virtual Box. This is a virtualisation software that we will be using for all labs in this module.

- If you are using a lab machine It is already pre-installed on your lab machine.
- If you are using your own machine you should have installed it and set it up. See Section 1

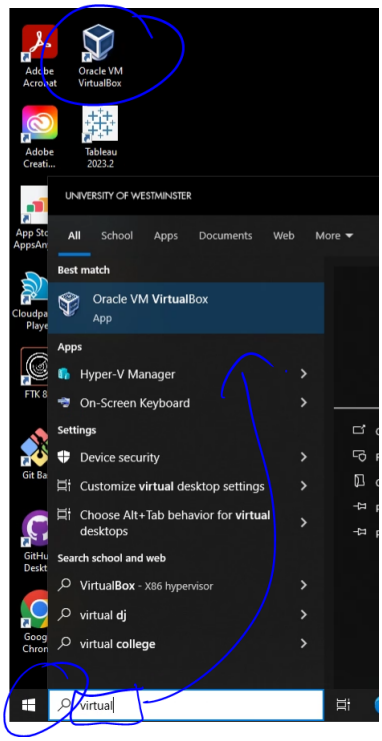

Figure 1: Start VirtualBox

(2) You can now start the Oracle VirtualBox software by either double clicking on the Oracle VM Virtual Box shortcut on the Desktop or by clicking on the windows button and typing virtual box as shown in Fig.1

(3) Once VirtualBox is running, Click on Add and

(4) Browse to the virtual machines folder as shown in Fig.2

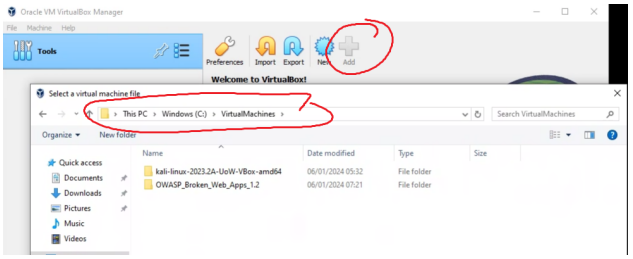

Figure 2: Locate VirtualMachines Fodler

(5) Now let's start by **Adding** Kali Linux machine.

(6) We browse to the Kali Linux folder and select "**kali-linux-2023.2-virtualbox-amd64.vbox**" and click open as shown in Fig.3

(7) Now you have the Kali Linux machine added as shown in Fig.4

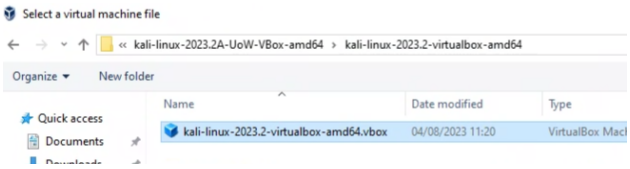

Figure 3: Add Kali Machine

Figure 4: Kali VM added

(8) Now We do the same to add the OWASP VM.

(9) Click on Add

(10) Browse to the OWASP VM folder, select it and it and press **Open** as shown in Fig.5

(11) Now we have both machines setup in Virtual box as shown in Fig.6.

(12) We can now move to setting up the network settings for the lab environment in Section 3

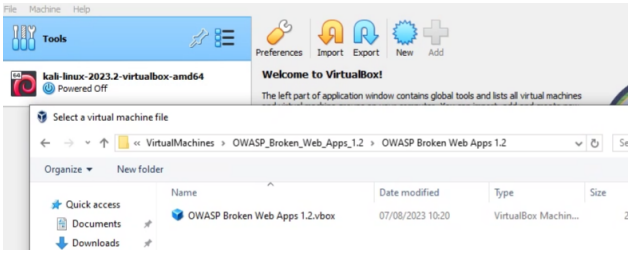

Figure 5: Add OWASP VM

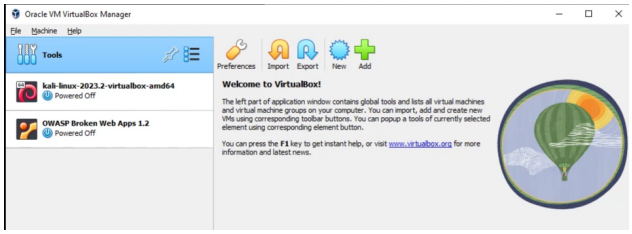

Figure 6: VMs setup on VirtualBox completed

3 Network Setup

- While working in the lab environment, you will need to ensure that it is isolated from the Internet
- One way of doing this is to create a private network
- All devices will join this network. isolated from the Internet.
- Sometimes, you need Kali to be connected to the Internet to download some scripts and tools or to conduct open Source Intelligence.
- However, it is essential that vulnerable machine VM stays on the private network.
- In this section we will look at:
  - We first need to create our private Virtual network environment as in section 3.1.
  - Once we have our private Virtual network environment, we can switch from Internet connected VMs to Private VMs.
    - To connect a VM to the Internet, or to the Virtual Private network environment called in VirtualBox "**Host-Only Network**" , see section 3.2

3.1 Private Virtual lab network environment

- Let us first both you will need to first create a Host-Only Network environment and set it up using the the following steps (shown in Fig.7):

Step.1- Click on the **three dots** next to tools.

- If you cannot see the three dots, make sure you click on tools

Step.2- Select **Network**

- If you find that you have a network already, you do not need to create it again. Just make sure the network IPv4 address is **192.168.56.1** as in step 3.

Step.3- Click on **Create**.

- If not, you can change it manually as per the setting shown in this step

Step.4- Click on **DHCP Server** and tick "**Enable Server**"

Step.5- Change the settings and make sure they are the same as below and click apply

- Server Address: 192.168.56.**99**
- Lower Address Bound: 192.168.56.**100**
- Upper Address Bound: 192.168.56.254
  - This limit the IP addresses our VMs can possibly be allocated to each an IP address between 192.168.56.100 to 192.168.56.254

- Now we have our Host-Only Network network set, we can switch between **Host-Only** or Internet connectivity via **NAT** connection.

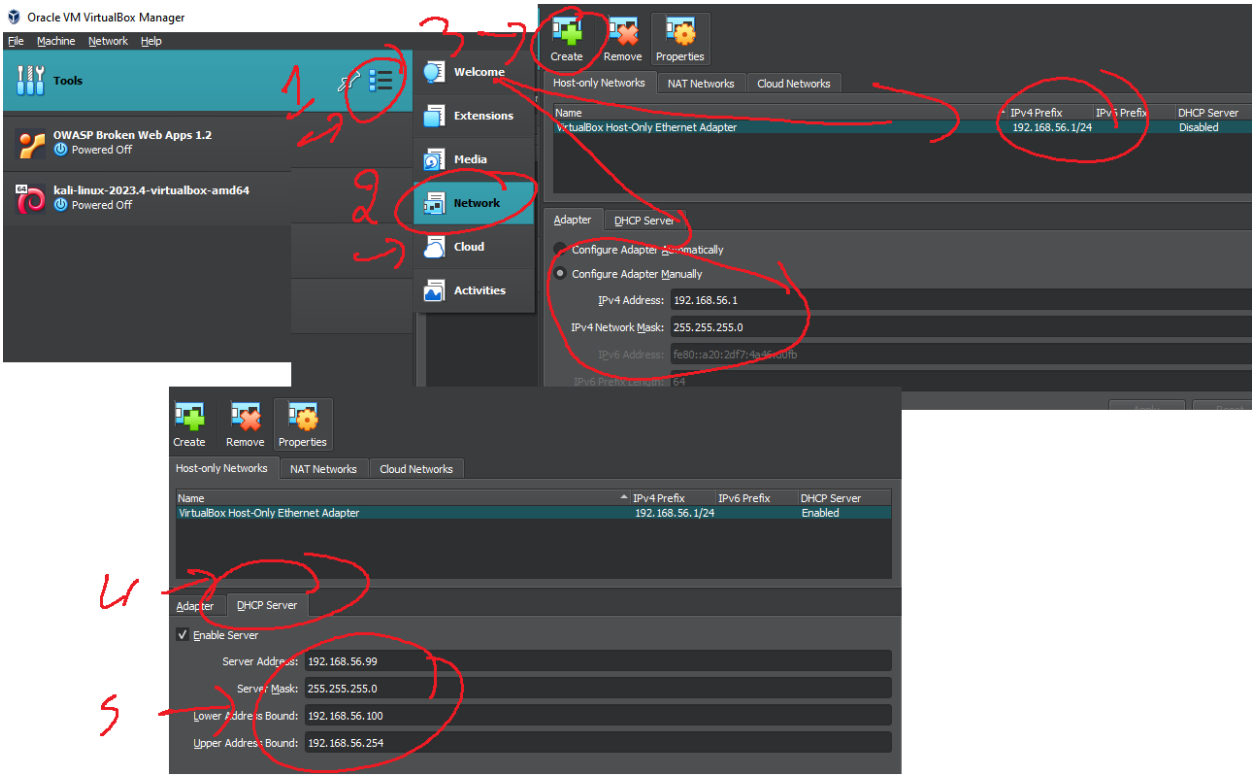

Figure 7: Host Only, DHCP network

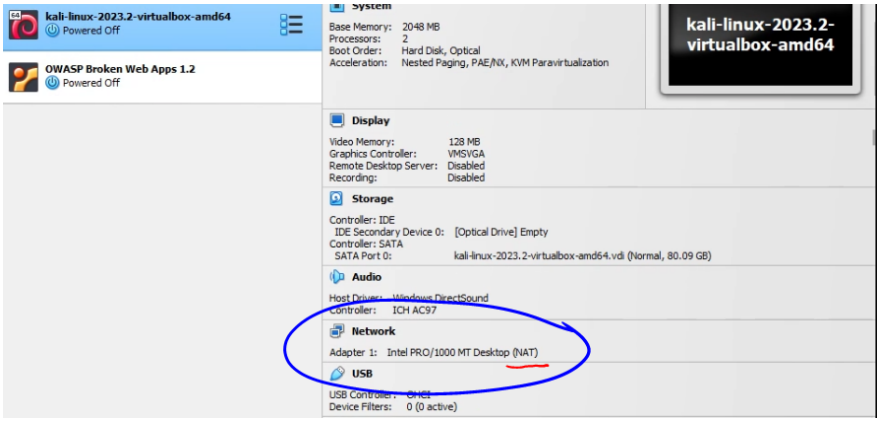

Figure 8: Kali Linux Default network Settings

3.2 Change VM Network Connection

- You can see which network the VM is connected to, simply by selecting it. For example, Kali by default is connected to the Internet via the **NAT** connection as shown in Fig,8
- To change the settings and switch to Host-Only (or the other way around), you can either click on **Settings** or **right click on the VM and select Settings** (Fig.9)
- Choose in the drop down menu of **Attached to** the option **Host Only Adapter**. You should see the Network Name as **Virtual Box host-only adapter.** as shown in Fig 11

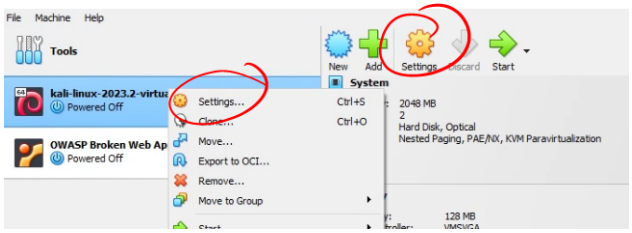

Figure 9: Choose Settings

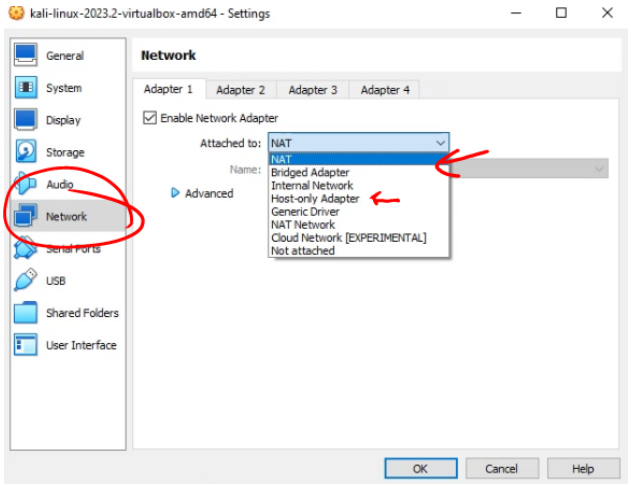

Figure 10: Select Network and click on the network connectivity you need

- Choose in the drop down menu of **Attached to** the option NAT. This is network Address Translation. This will give your virtual machine access to the network resources of your host machine. It will use the same IP address of your host machine to connect to the Internet. (Fig.10)
- **The steps shown in Figures 8, 9, 10, 11 need to be repeated for each VMs to ensure that all of them are on the same network or when you need a VM to be connected to the Internet.**

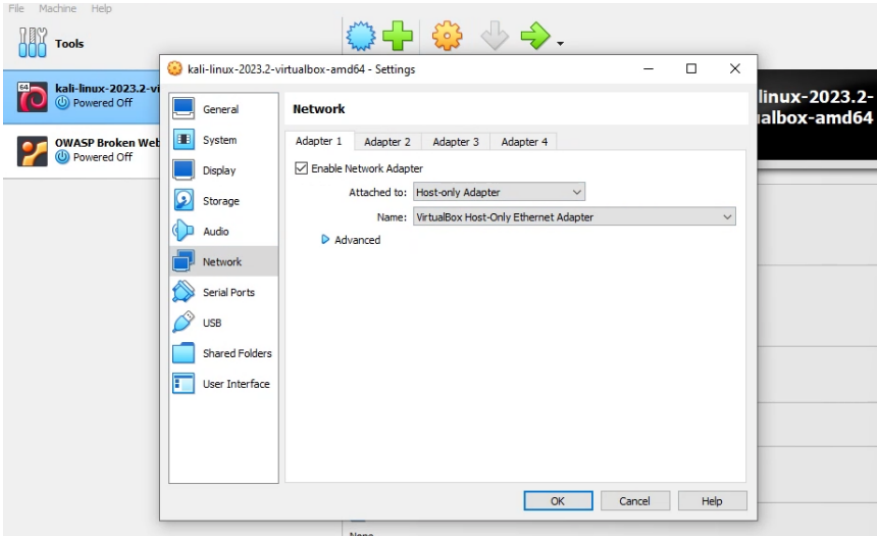

Figure 11: Host Only Adapter Settings

3.3 Start the VMs Test connectivity

VMs usernames and passwords

1. Kali Linux (Kali-linux-2022.3-UoW-vitualbox-amd64)
   - username: kali
   - password: kali
2. Owaspbwa linux (OWASP Broken Web Apps VM 1.2)
   - username: root
   - password: owaspbwa

- We can now start both VMs and see test connectivity.
- For each machine you want to start, either **double click on it**, or select it and click **Start**
- Enter the username and password for each VM
  - **Note:** On any Linux terminal, including the OWASP VM: When you enter a password, you will not see it on the terminal. The idea is to hide the length of the password if anyone is standing behind you and looking.
- To check your ip address, in any of those virtual machine devices you open a terminal and type:
  - **ifconfig**
- In Windows you can open a command line Interface by clicking on start and typing cmd.
  - **ipconfig**
- For example: on Kali Linux VM, we can check our IP as shown in the steps below (shown in Fig.12):

Step.1- Click on **the terminal Emulator Shortcut** to start the Terminal

Step.2- To check your IP address type **ifconfig**

– What does the output means:
  * eth0 is the virtual network interface, the interface that connected our Virtual machine to the host (my physical machine): In my case, it is 192.168.56.100 - This means that my machine is connected to the Virtual private network we created earlier on in section 3.1
  * lo is the localhost interface (also called loopback). the localhost IP 127.0.0.1 is an IP used for testing services on the machine. if you connect to it, it loops back to your machine. We don't need it now, but it will appear when you type **ifconfig**

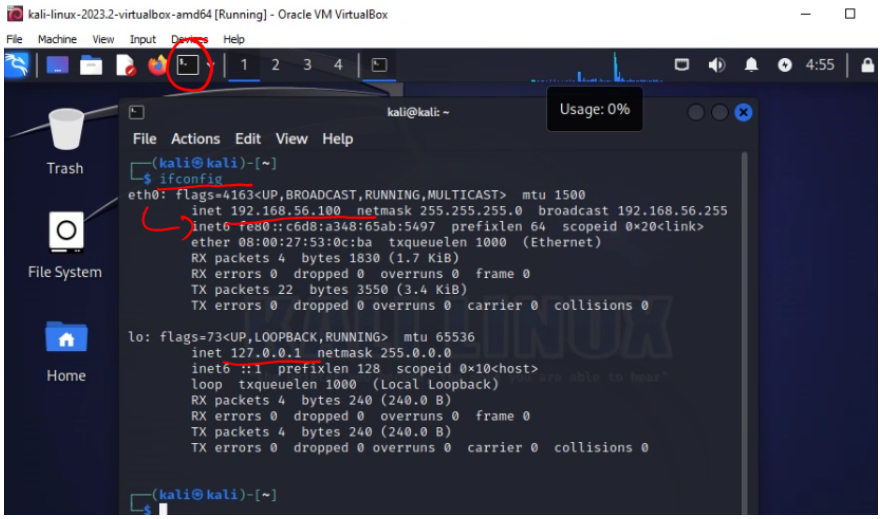

Figure 12: Check IP address on Kali

- All the steps should be done on the OWASP VM and on any other VM you can possibly connect.

Change IP without restarting

- You do not need to restart the machine to change the network settings.
- What you need to do is the following:

Step.1- Click on **Machine** as shown in Fig.13

Step.2- Select **Settings** as shown in Fig.13

Step.3- Choose "Change adapter Settings" to "Host-only Adapter, or to "NAT" as shown in Fig.13

Step.4- Click **ok**

Step.5- open Terminal and type

sudo ifconfig eth0 down

  * This will disable the eth0 interface as shown in Fig.14

sudo ifconfig eth0 up

  * This will enable the eth0 interface again with a new IP as shown in Fig.14

– Check IP address again:

ifconfig

· IP changed to NAT IP as shown in Fig.14

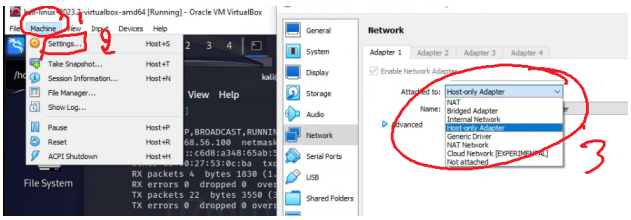

Figure 13: Change IP without restarting

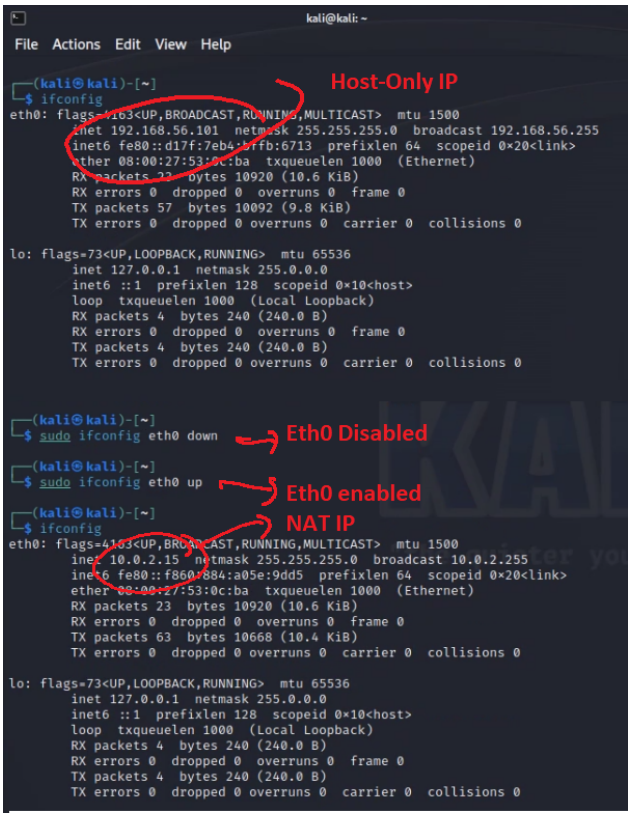

Figure 14: Check IP address on Kali

3.4 Test connectivity

- To test connection between devices, they **MUST** be on the same network.
- We can test connectivity between machines on the terminal by using **ping** command both on Windows or Linux.
- **Note:** You will need to check your IP addresses before you do this step. Your VMs IP addresses might be different then the one in the examples below.. My IP addresses are shown in Fig.15

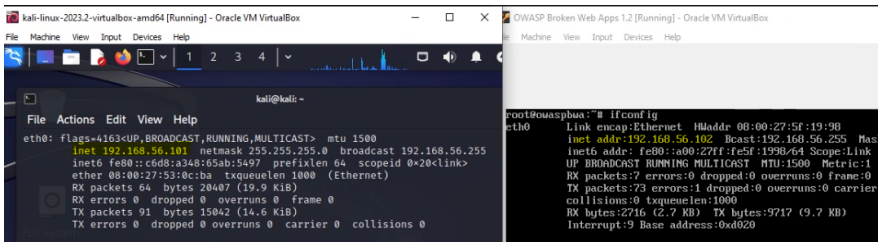

Figure 15:

- To check connectivity between devices:
  - To ping the vulnerable machine from kali:

    ping 192.168.56.102
  - To ping kali machine from the vulnerable machine

ping 192.168.56.101

- when we selected host only network we created a private network between our VMs that is completely isolated from the external world.
- Your host machine also have a virtual Box interface that connects your device to the private network.
  - To ping your host machine (physical) machine from the kali machine:

    ping 192.168.56.1
- In Fig.16, you can see my lab environment setup based on the tests we did now.

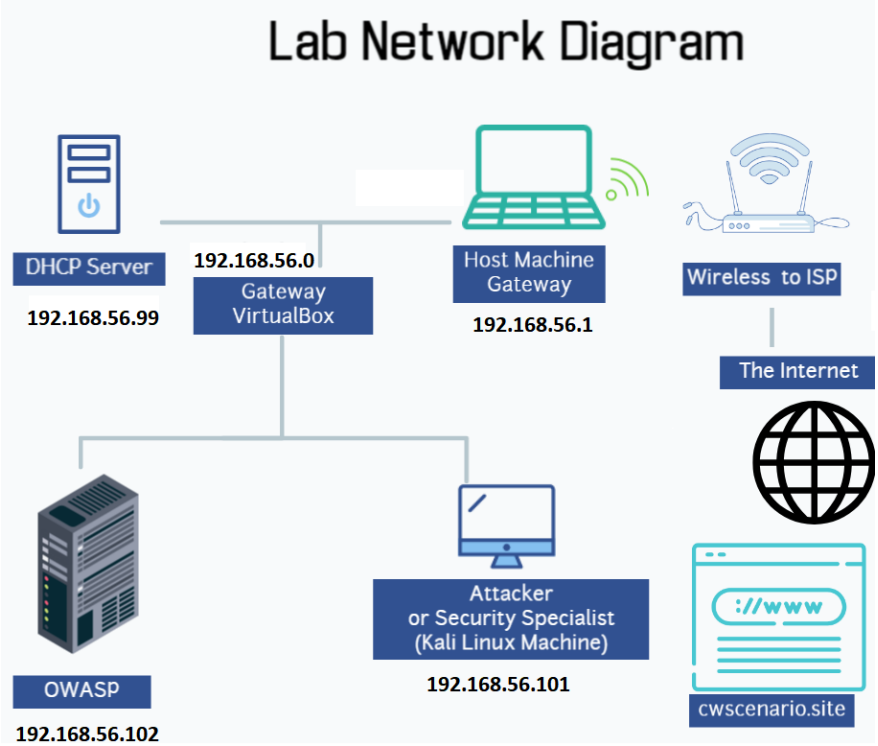

Figure 16: Check IP address on Kali

4 Problems that you can possibly face

Problems you can possibly have, **only on your personal machine:**

1. Sometimes, the machines do not start and give an error. It will tell you what the problem is: Usually, it is:
   - Either no space for the machines to start. You should free up some space for the machines.
   - or VM virtualisation should be enabled from BIOS. Check this link from Microsoft on how to do this If you need help, please ask your lab tutor.
2. If you cannot see Host-Only adapter, it means you did not create the network, On Vbox, Make sure you created the virtual Host only network interface first.
3. On some machines, you need to change the USB setting for the VM to USB 1.1 as shown in fig below. This applies for any machines that throw the USB error.
4. if the network do not change ONLY from NAT to Host-Only, you can type **sudo dhclient**

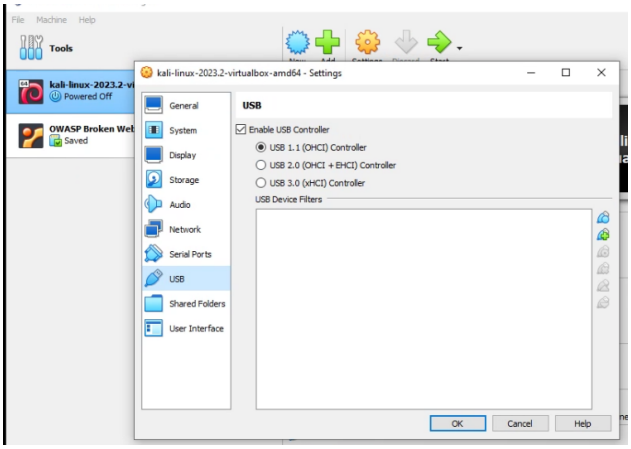

Figure 17: USB error