Checkpoint 1:

Aim of the checkpoint: To set up the environment that the students would be working in for the course project. The idea is to be able to send and receive messages from one machine to another, these devices would eventually have a role in the system design of the smart lock network setup. Once set up, the student must be able to capture packets that are sent and received from the devices.

Three devices that would be identified at the end of the checkpoint are:

1. A Mobile phone
2. A Laptop/Desktop (Windows/Mac)
3. A Virtual Machine

On your machine (Laptop/Desktop)download an Apache server called XAMPP server. (link: https://www.apachefriends.org/download.html). Following the default installation procedure instal the server on the local machine. By default, it uses port 80 to listen to the incoming request and the web root is “htdocs”.

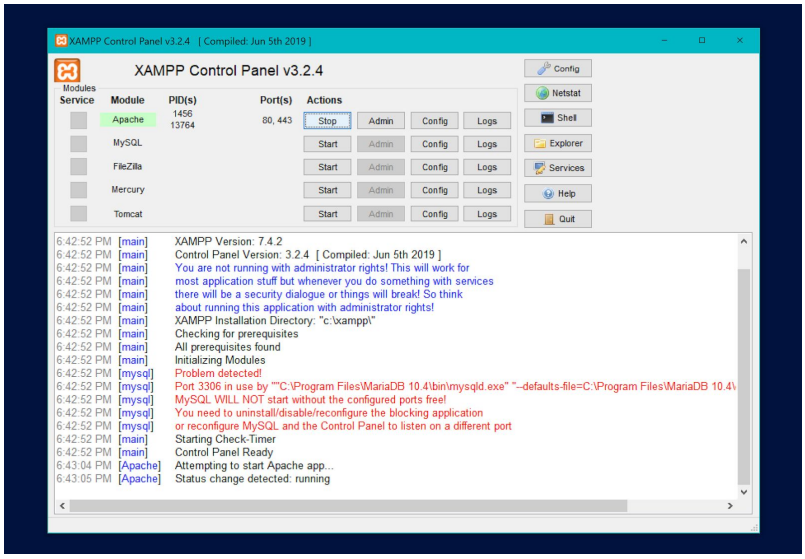
Follow the instructions to create a simple php file :

1. Go to the location where xampp is installed on your machine.
2. Inside XAMPP folder, go to **htdocs**
3. Create a new folder by the name “PHPTest” or give the name of your choice.
4. create a php file “index.php”
5. write this in this index.php file and save the file:

```
<?php

print_r($_GET);
```

6. Go to the xampp controller, and start the apache server.

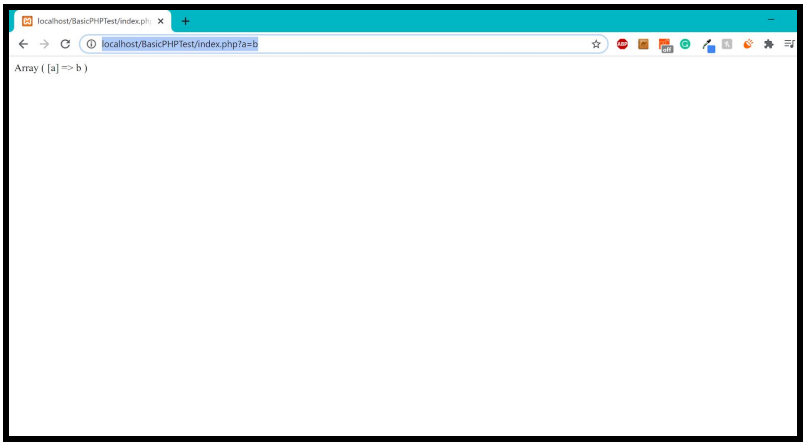


7. Open your browser and in the url tab type:

   url = hostIP/<path>/<file_name> ?a=b

   hint: use ipconfig (windows) or ifconfig (linux) to get your IP address.

8. When you would hit enter you would be served a page that should look like the one shown below.



This indicates successful installation of the XAMPP server on your machine. We can call this the host machine now.

Now, get wireshark installed and running on your computer.

link: https://www.wireshark.org/download.html

Follow the instructions to install and have a virtual machine on the computer:

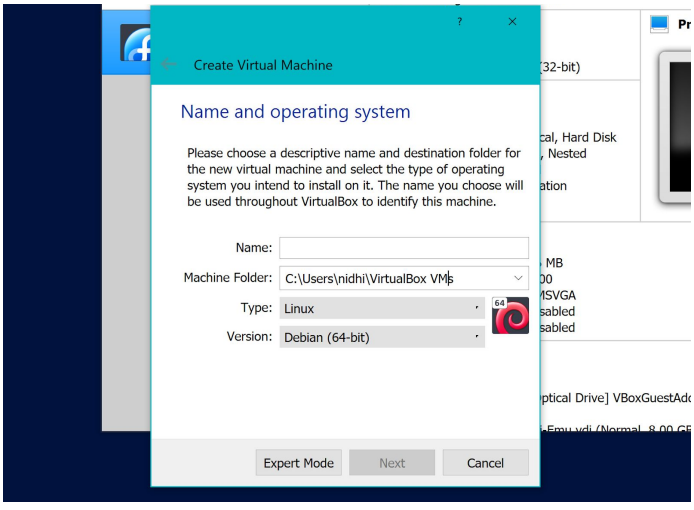
1. Get a virtual box, This will help stimulate Raspberry Pi on your host machine.

   link: https://www.virtualbox.org/wiki/Downloads

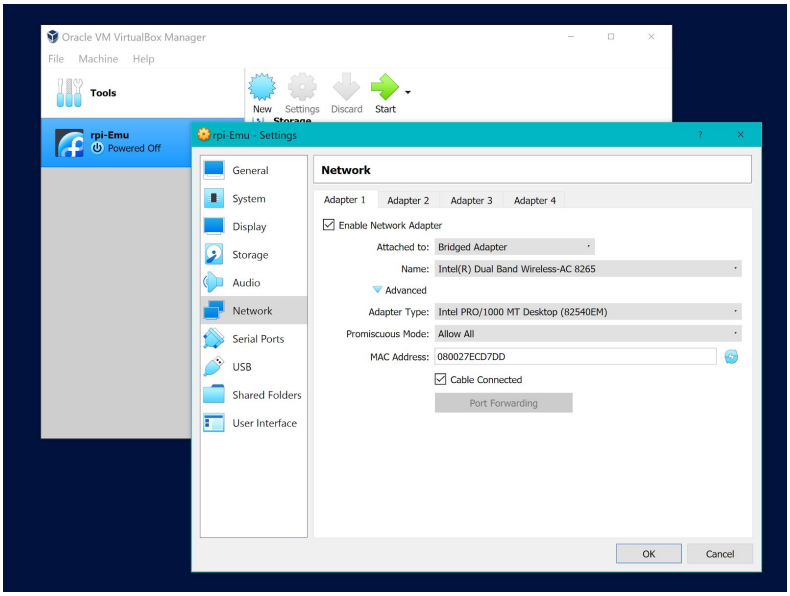
2. Get Raspbian Desktop image from :

   link: https://www.raspberrypi.org/software/raspberry-pi-desktop/

3. Install and set up a virtual machine for Raspberry pi. (follow the default steps except when specifying name and operating system example given below) and allocate at least 1GB of RAM and 10 GB of hard disk space in the following steps)



4. Choose “install” instead of “install with persistence” when the virtual machine starts for the first time
5. Once the virtual machine is up and running :
    a. Set up the name and password for the virtual machine.
    b. Using the command line (ifconfig) find out the ip address of the virtual machine.
    c. Install wireshark using the following command: sudo apt-get install wireshark
    d. Shut down the machine, go to settings of the virtual machine, open the network tab and change the “Attached to” to “Bridged Adapter” and “Promiscuous Mode” to “Allow All”. Refer the image below:
    e. Reboot the machine



The task: Now that your virtual machine is set, your workstation has a XAMPP server running and Wireshark installed on both machines. do the following:

Task 1: Mobile-Workstation message exchange.

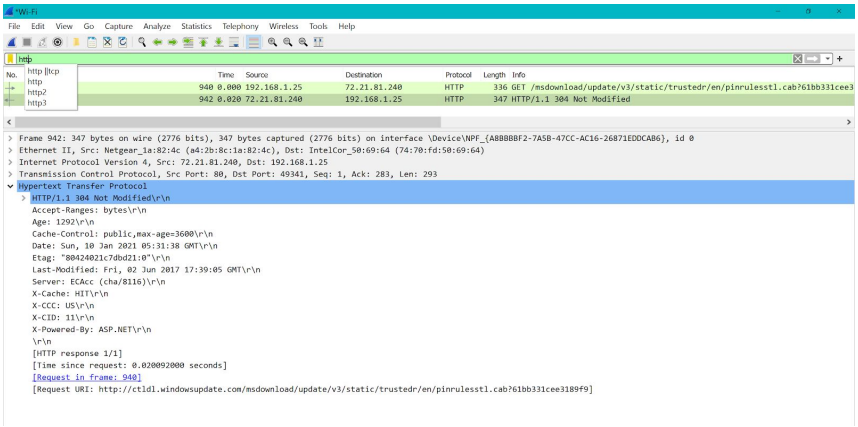
a. Get the IP address of the workstation (for windows: type ipconfig in terminal, for linux type ifconfig in terminal)
b. Open wireshark, select “wifi” interface.
c. Use the phone (connected on the same network as the server) to request the php page you just created, using the URL :

    hostIP/<path>/<file_name> ?a=b

d. When you hit enter after typing the URL in mobile’s browser a request is sent to the host and a response is received by the mobile’s browser. At this point stop the wireshark capture and answer the following:

- **How to filter out the packets exchanged using http protocol)?**

  Hint: There are various ways to filter to find the desired packers (https://wiki.wireshark.org/CaptureFilters). One of them is by the protocol name. you can use the same method. the example of which is provided below:



- **What is the packet size of request and response?**

  Hint: Packet size if the length of the packet sent from the source to the destination.

- **What is the IP in the captured packet?**

  Hint: IP address of the machines that are sending packets to each other, is mentioned under “source” and “destination”

- **How long does it take to receive the response once the request is sent ?**

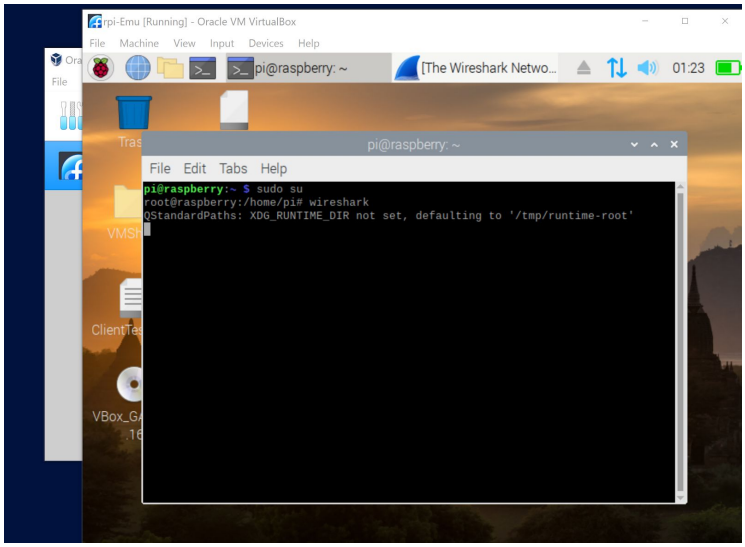
  Hint: you will find this named “Time Since Request” in the http packet. Refer to the image above.

Task 2: Virtual Machine - Host machine message exchange

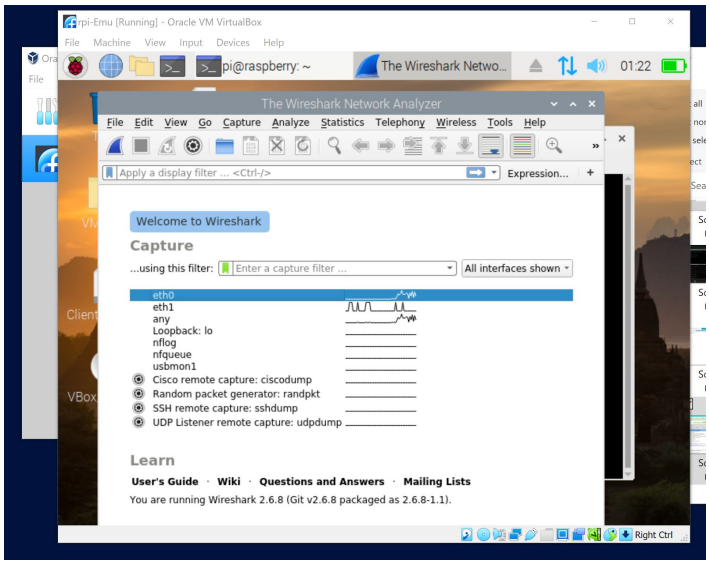
While the XAMPP server is running, start the virtual machine, open the terminal and type the following:

1. sudo su (this will switch to the root user).
2. wireshark (this will open wireshark)

refer to the image below:



once the wireshark starts, you will have a similar window:



Here select eth0 and the wireshark will begin to capture the packers sent from this interface.

Now open the browser in the virtual machine and repeat the steps from Task 1.c and d and answer the same questions, but using this capture from the virtual machine.

Turn in:

Screenshot of the wireshark packet capture from the both the tasks along with the answers to the questions.