

南京大学本科生实验报告

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1. 实验名称 计网 lab3

2. 实验目的 实现路由器的处理 arp 请求功能，构造 arp 表

3. 实验内容与核心代码

a) 处理 ARP 请求：对于收到的 packet，通过 `arp = packet.get_header(Arp)` 获取其 arp 表头，若为空则不做任何操作，不为空则遍历网络接口，查找其中是否有 arp 请求中的目标 ip，有则创造数据包并回复该请求；

```
arp = packet.get_header(Arp)
if arp:
    cc = 0
    for intf in self.net.interfaces():
        if intf.ipaddr == arp.targetprotoaddr:
            cc = 1
            response = create_ip_arp_reply(intf.ethaddr, arp.senderhwaddr, intf.ipaddr, arp.senderprotoaddr)
            self.net.send_packet(intf.name, response)
```

b) 构造 arp 表：在 router 的初始化函数中加入字典 `self.my_arptable`，利用变量 `cc` 的值判断是否存在匹配的接口，若存在则在 arp 表中加入，并依据 `timeout` 更新，打印该表（为便于区分多次打印，`self.count_of_print` 作为统计打印次数的变量，并与表一起输出）；

```

if cc == 1:
    self.my_arptable[arp.senderprotoaddr] = [arp.senderhwaddr,time.time()]
    for i in list(self.my_arptable.keys()):
        if time.time()-self.my_arptable[i][1] >= 100:
            del self.my_arptable[i]
    log_info(str(self.count_of_print))
    for i in list(self.my_arptable.keys()):
        log_info(str(self.my_arptable))

```

4. 实验测试方式与结果:

a) Test 结果如下:

均通过

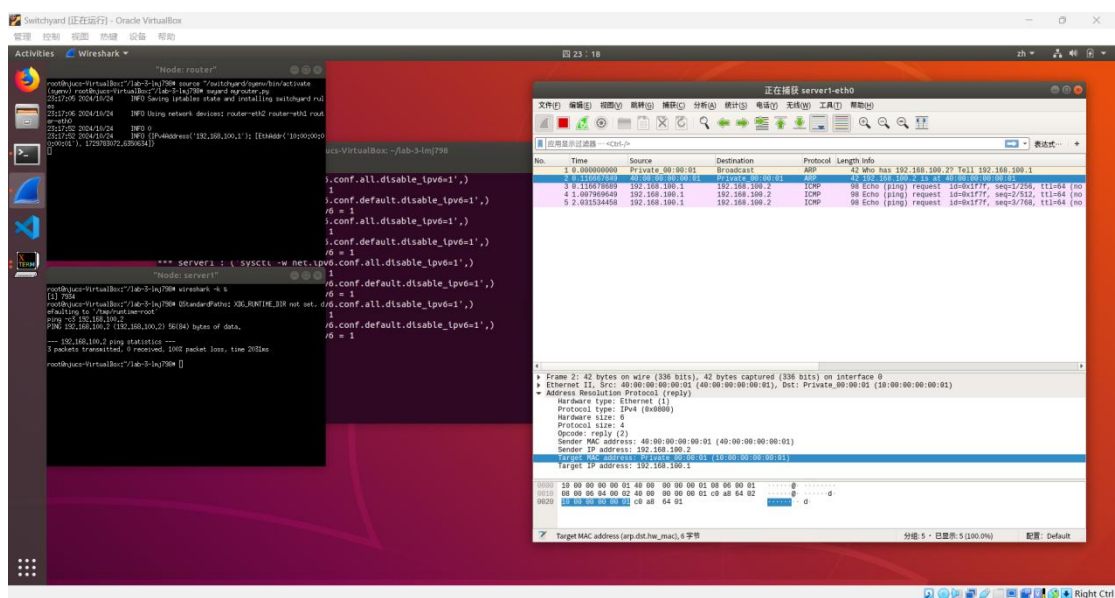
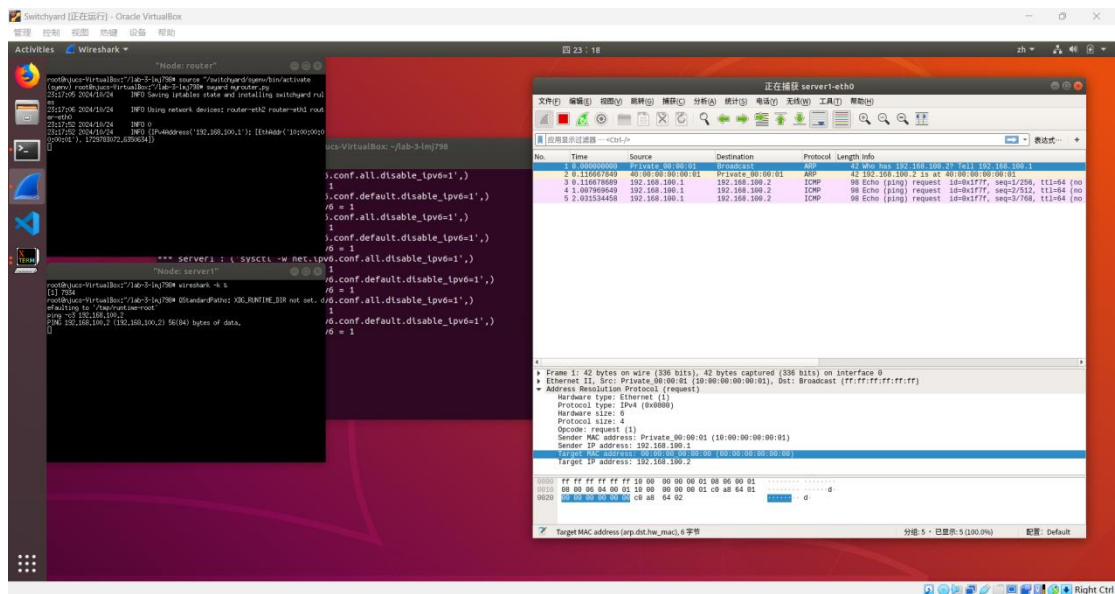
The screenshot shows a Visual Studio Code editor with a Python script named 'myrouter.py'. The script implements a router daemon with the following key components:

- Initialization:** Sets up a daemon process and imports necessary modules like `ipaddress`, `time`, and `logging`.
- ARP Table Management:** A dictionary `my_arptable` stores IP-to-MAC mappings. It includes logic to delete entries that are older than 100 seconds.
- Packet Handling:** A `while True` loop receives packets. It checks if they are ARP requests or responses and updates the ARP table accordingly.
- Testing:** A `def test:` function is used to verify the router's behavior under various conditions, such as handling requests from different interfaces or verifying response times.

The terminal window on the left displays the output of the `test` function, showing that all tests passed successfully.

b) Wireshark 与 xterm 输出:

Wireshark 输出如下:



5. 总结与感想

- 给定测试文件中好像并没有关于属于 arp 请求但是与接口不匹配的情形