

# CS305-2022Spring Lab2 Report

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Lab Time: Thursday 10:20 a.m. to 12:10 p.m.

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## Practice 1

- **Problem: Find Narcissistic Numbers**
- **Source Code**

```
def narcissistic(value: int) -> bool:
    length = len(str(value))
    subs = [int(single) ** length for single in str(value)]
    sum3 = sum(subs)
    del subs
    return sum3 == value

def find_narcissistic_number(start: int, end: int) -> list:
    result = []
    for number in range(start, end + 1, 1):
        if narcissistic(number):
            result.append(number)
    return result

print(' '.join([str(i) for i in find_narcissistic_number(1, 1000000)]))
```

This program can display all the narcissistic numbers from 1 to 1,000,000(including).

- **Commands and Screenshots**

Type this in the command line:

```
python3 narcissistic_number.py
```

And this is the screenshot of the python source code.

```
D:\PycharmProjects\CS305\venv\Scripts\python.exe D:/PycharmProjects/CS305/narcissistic_number.py
1 2 3 4 5 6 7 8 9 153 370 371 407 1634 8208 9474 54748 92727 93084 548834
```

```
Process finished with exit code 0
```

## Practice 2

- Problem: Wireshark

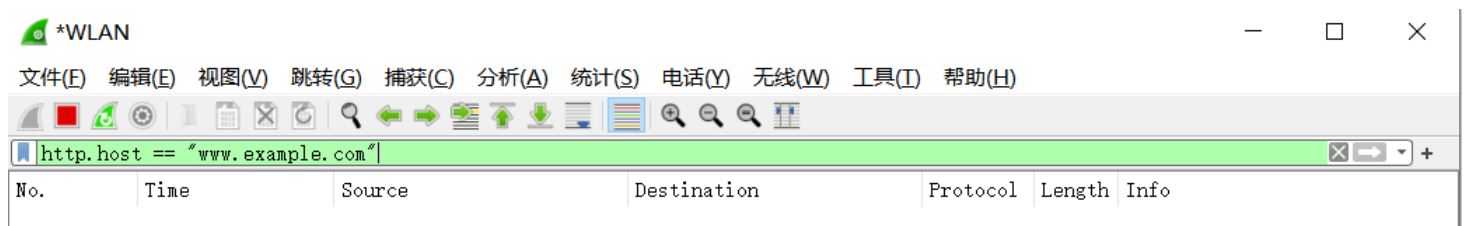
### Problem 2-1

#### Q1

Filter: Capture Filter. Since capture filter can select those packets satisfying the requirements.

#### Q2

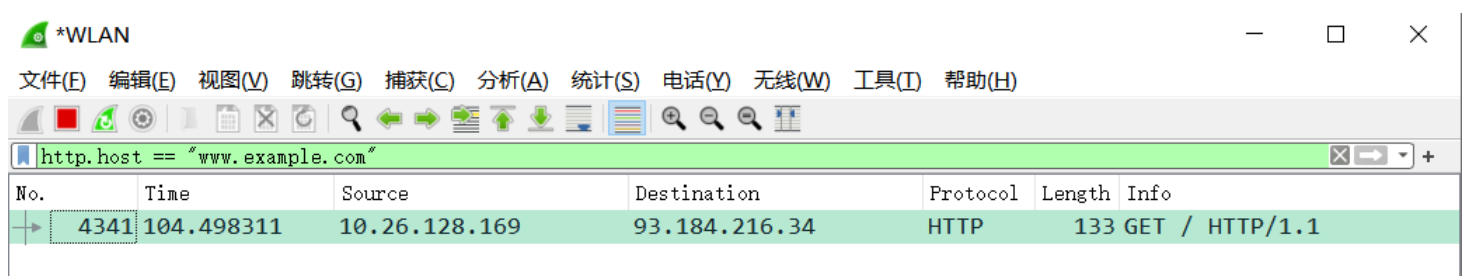
**Step 1:** Use display filter to find out the ip address of [www.example.com](http://www.example.com). But unfortunately, we cannot find any packets since we haven't built connection with the destination address.



**Step 2:** Type the following in the command line, so that curl can send request via ipv4.

```
curl --ipv4 www.example.com
```

Then it can be seen that the ip address of [www.example.com](http://www.example.com) is 93.184.216.34, and localhost is 10.26.128.169.



### **Step 3: Add the new capture filter.**

This is the filter requirement:

```
src host 93.184.216.34 and dst host 10.26.128.169
```

### **Step 4: Select a packet we need.**

- Packet we select:

▼ Internet Protocol Version 4, Src: 93.184.216.34, Dst: 10.26.128.169

0100 .... = Version: 4

.... 0101 = Header Length: 20 bytes (5)

> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

Total Length: 52

Identification: 0x09c1 (2497)

> Flags: 0x00

...0 0000 0000 0000 = Fragment Offset: 0

Time to Live: 50

Protocol: TCP (6)

Header Checksum: 0xbe65 [validation disabled]

[Header checksum status: Unverified]

Source Address: 93.184.216.34

Destination Address: 10.26.128.169

> Transmission Control Protocol, Src Port: 80, Dst Port: 10439, Seq: 0, Ack:

0000	04 33 c2 ed ef 59 3c 8c 93 d0 83 c1 08 00 45 00	·3···Y<· ·····E·
0010	00 34 09 c1 00 00 32 06 be 65 5d b8 d8 22 0a 1a	·4····2· ·e]··"··
0020	80 a9 00 50 28 c7 0a 72 74 54 c1 86 38 95 80 12	···P(·r tT·8···
0030	ff ff 0c 68 00 00 02 04 05 b4 01 01 04 02 01 03	···h···· ······
0040	03 09	··

- Source Address

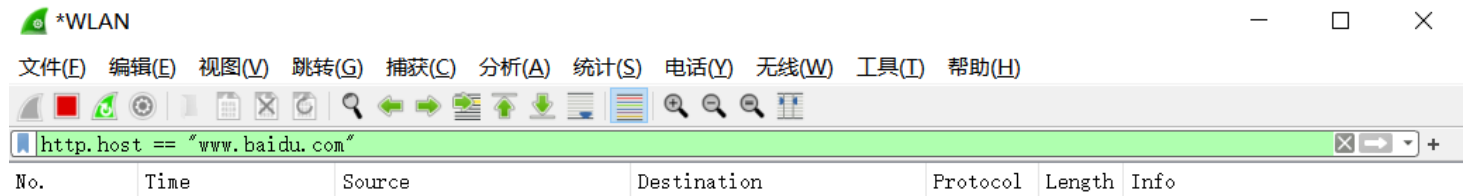


# Q1

The process of this part is as same as Q2 in Problem 2-1.

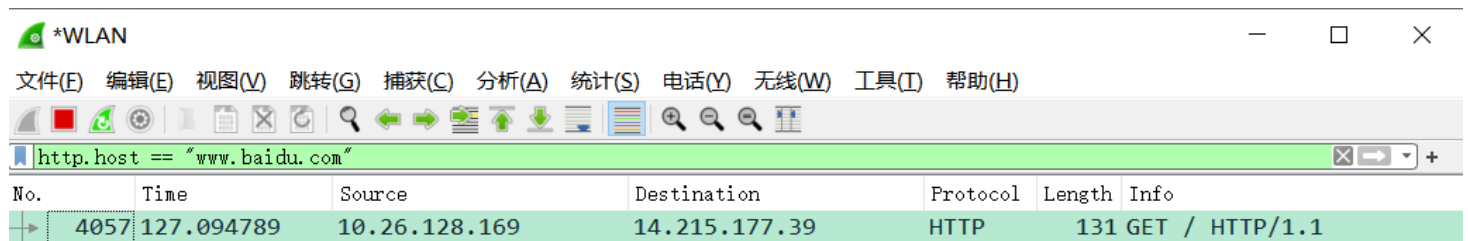
So only screenshots and commands will be displayed.

## Step 1



## Step 2

```
curl --ipv4 www.baidu.com
```



## Step 3

- Packet we select:

> Frame 4055: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on in^  
 > Ethernet II, Src: JuniperN\_d0:83:c1 (3c:8c:93:d0:83:c1), Dst: IntelCor\_ed:e  
 ▾ Internet Protocol Version 4, Src: 14.215.177.39, Dst: 10.26.128.169
 

0100 .... = Version: 4  
 .... 0101 = Header Length: 20 bytes (5)  
 > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)  
 Total Length: 52  
 Identification: 0x4f7d (20349)  
 > Flags: 0x40, Don't fragment  
 ...0 0000 0000 0000 = Fragment Offset: 0  
 Time to Live: 54  
 Protocol: TCP (6)  
 Header Checksum: 0xaa85 [validation disabled]  
 [Header checksum status: Unverified]  
 Source Address: 14.215.177.39

0000	04 33 c2 ed ef 59 3c 8c 93 d0 83 c1 08 00 45 00	·3···Y<· ·····E·
0010	00 34 4f 7d 40 00 36 06 aa 85 0e d7 b1 27 0a 1a	·40} @·6· ·····'·
0020	80 a9 00 50 27 57 72 b1 85 cc f7 b0 21 88 80 12	···P'Wr· ·····!··
0030	20 00 ca eb 00 00 02 04 05 ac 01 03 03 05 01 01	················
0040	04 02	··

- Source Address:

Source Address: 14.215.177.39

Destination Address: 10.26.128.169

Transmission Control Protocol, Src Port: 80, Dst Port: 10071, Seq: 0, Ack:

Source Port: 80

0000	04 33 c2 ed ef 59 3c 8c 93 d0 83 c1 08 00 45 00	·3···Y<· ·····E·
0010	00 34 4f 7d 40 00 36 06 aa 85 0e d7 b1 27 0a 1a	·40} @·6· ·····'·
0020	80 a9 00 50 27 57 72 b1 85 cc f7 b0 21 88 80 12	···P'Wr· ·····!·
0030	20 00 ca eb 00 00 02 04 05 ac 01 03 03 05 01 01	····· ·····
0040	04 02	··

- Source Port:

Transmission Control Protocol, Src Port: 80, Dst Port: 10071, Seq: 0, Ack:

Source Port: 80

0000	04 33 c2 ed ef 59 3c 8c 93 d0 83 c1 08 00 45 00	·3···Y<· ·····E·
0010	00 34 4f 7d 40 00 36 06 aa 85 0e d7 b1 27 0a 1a	·40} @·6· ·····'·
0020	80 a9 00 50 27 57 72 b1 85 cc f7 b0 21 88 80 12	···P'Wr· ·····!·
0030	20 00 ca eb 00 00 02 04 05 ac 01 03 03 05 01 01	····· ·····
0040	04 02	··

- Destination Address:

Destination Address: 10.26.128.169

Transmission Control Protocol, Src Port: 80, Dst Port: 10071, Seq: 0, Ack:

Source Port: 80

0000	04 33 c2 ed ef 59 3c 8c 93 d0 83 c1 08 00 45 00	·3···Y<· ·····E·
0010	00 34 4f 7d 40 00 36 06 aa 85 0e d7 b1 27 0a 1a	·40} @·6· ·····'·
0020	80 a9 00 50 27 57 72 b1 85 cc f7 b0 21 88 80 12	···P'Wr· ·····!·
0030	20 00 ca eb 00 00 02 04 05 ac 01 03 03 05 01 01	····· ·····
0040	04 02	··

- Destination Port:



Transmission Control Protocol, Src Port: 80, Dst Port: 10071, Seq: 0, Ack:

Source Port: 80

Destination Port: 10071

[Stream index: 100]

[Conversation completeness: Complete, WITH\_DATA (31)]

0000 04 33 c2 ed ef 59 3c 8c 93 d0 83 c1 08 00 45 00 ·3···Y<· ·····E·

0010 00 34 4f 7d 40 00 36 06 aa 85 0e d7 b1 27 0a 1a ·40}@·6· ·····'·

0020 80 a9 00 50 27 57 72 b1 85 cc f7 b0 21 88 80 12 ···PWr· ·····!·

0030 20 00 ca eb 00 00 02 04 05 ac 01 03 03 05 01 01 ······ ······

0040 04 02 ······ ······

Source Address: 14.215.177.39(0e.d7.b1.27 in hexadecimal)  
Source Port: 80(0050 in hexadecimal)  
Destination Address: 10.26.128.169(0a.1a.80.a9 in hexadecimal)  
Destination Port: 10071(2757 in hexadecimal)

Q2

Comparing the result in Q2 of Problem 2-1 and Q2 of Problem 2-2:

	www.example.com	www.baidu.com
Source Address	93.184.216.34	14.215.177.39
Source Port	80	80
Destination Address	10.126.128.169	10.126.128.169
Destination Port	10439	10071

And we can find that the source port and destination address are identical in the two cases.