Computer Network Term Project Report

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설치 및 실행방법

Install

```
-> make all
```

Run

```
-> make run
```

*Remove *.out*

```
-> make clean
```

구현방법

1. pcap_findalldevs() 함수를 이용하여 모든 네트워크 인터페이스를 @alldevs에 저장한다.

```
if (pcap_findalldevs(&alldevs, errbuf) == -1) {
    fprintf (stderr, "Error in pcap_findalldevs: %s\n", errbuf);
    exit(1);
}
```

2. 선택된 네트워크 인터페이스를 pcap_open_live() 를 이용하여 가져온다.

```
pcd = pcap_open_live(d->name, BUFSIZ, 1, 1000, errbuf);
if (pcd == NULL) {
    fprintf(stderr,"\nunable to open the adapter. %s is not supported\n", d->name);
    /* Free the device list */
    pcap_freealldevs(alldevs);
    return -1;
}
else {
    printf("\nselected device %s is available\n", d->description);
}
```

3. pcap_loop() 를 이용하여 패킷을 캡쳐한다.

```
pcap_loop(pcd, -1, callback, NULL);
```

4. 들어오는 패킷에 대해 호출되는 callback() 함수는 다음과 같다.

```
void callback(u_char *param, const struct pcap_pkthdr *header, const u_char *pkt_data)
{
    struct ether_header *ehdr;
    unsigned short proto_type;

    // 이더넷 헤더
    ehdr = (struct ether_header *)pkt_data;

    // IP 헤더 (이더넷 헤더 크기만큼 offset)
    pkt_data += sizeof(struct ether_header);

    // 프로토콜 타입
    proto_type = ntohs(ehdr->ether_type);

    if (proto_type == ETHERTYPE_IP) { // IPv4
        struct ip *ip_hdr = (struct ip *)pkt_data;
        print_IPv4 (ip_hdr->ip_p, ip_hdr, (pkt_data + ip_hdr->ip_hl * 4));
    }
}
```

5. print_IPv4() 함수는 각 프로토콜에 맞는 출력을 수행한다.

```
void print_IPv4 (int PROTO_TYPE, struct ip* ip_hdr, void* proto_hdr) {
    if (PROTO_TYPE == IPPROTO_TCP) {
        printf ("%c[1;31m", 27);

        struct tcphdr *tcp_hdr = (struct tcphdr *)proto_hdr;
        _print_IPv4_time_and_mac_addr (ip_hdr);
        printf ("(%15s->%15s) TCP\t[port:%5d->%5d][seq:%10u][ack:%10u]",
            inet_ntoa(ip_hdr->ip_src),
            inet_ntoa(ip_hdr->ip_dst),
            ntohs(tcp_hdr->th_sport),
            ntohs(tcp_hdr->th_dport),
            tcp_hdr->th_seq,
            tcp_hdr->th_ack
        );

        printf ("%c[0m\n", 27);
    }
    else if (PROTO_TYPE == IPPROTO_UDP) {
```

6. MAC 주소를 호출하기 위한 함수의 원형은 다음과 같다. @ehdr->ether_shost 와 @ehdr->ether_dhost 를 형식에 맞게 출력한다.

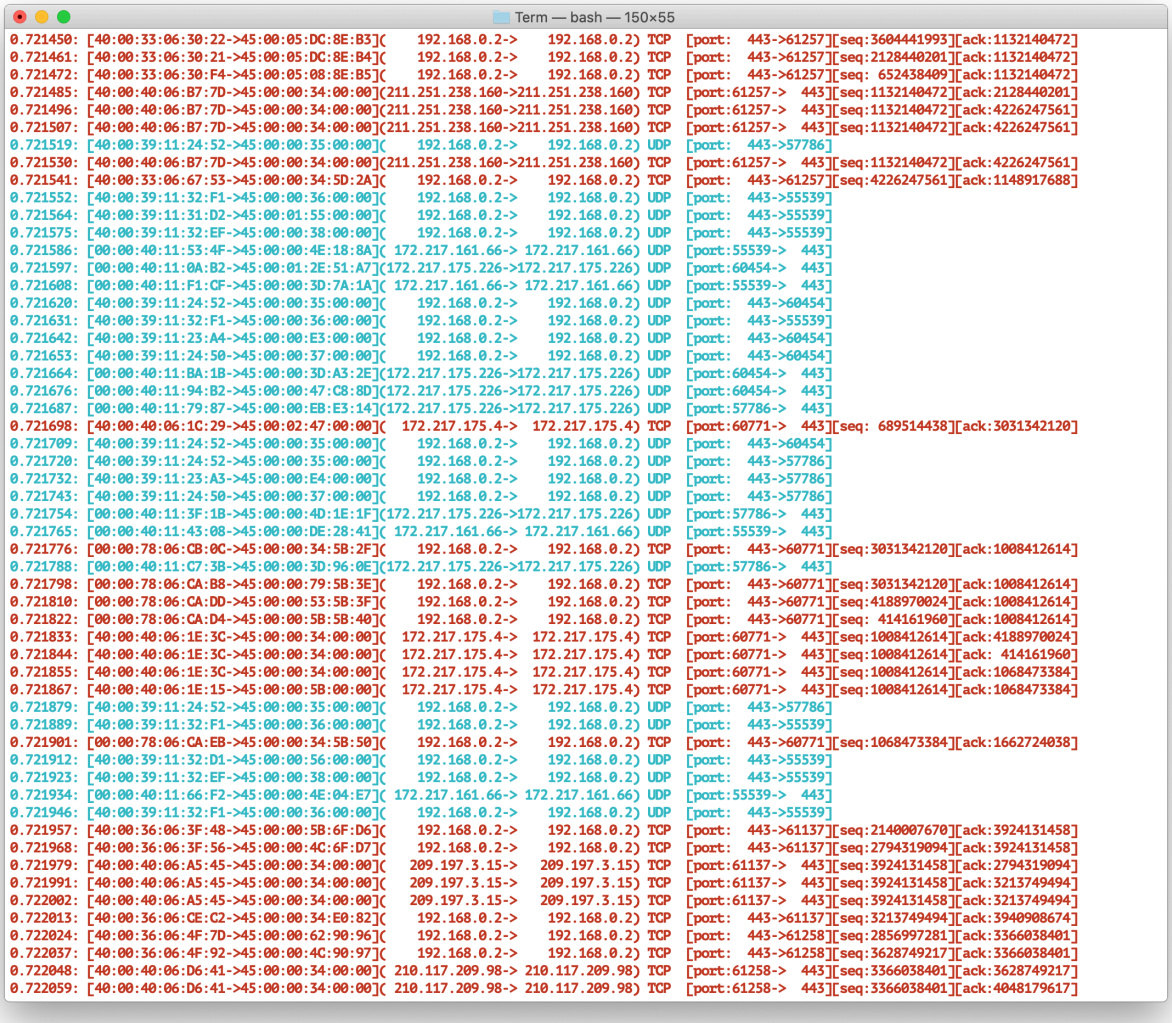
```
void _print_IPv4_time_and_mac_addr (struct ether_header *ehdr) {
```

실행화면

```
root@wooseokyourself-B450M-DS3H:/home/wooseokyourself/simple_packet_capture# ./a.out
1. enp4s0 (No description available)
2. any (Pseudo-device that captures on all interfaces)
3. lo (No description available)
4. docker0 (No description available)
5. nflog (Linux netfilter log (NFLOG) interface)
6. nfqueue (Linux netfilter queue (NFQUEUE) interface)
7. usbmon1 (USB bus number 1)
8. usbmon2 (USB bus number 2)
9. usbmon3 (USB bus number 3)
10. usbmon4 (USB bus number 4)
11. usbmon5 (USB bus number 5)
12. usbmon6 (USB bus number 6)
Enter the interface number (1-12):1

selected device (null) is available
0.000061: [40:00:40:06:C1:88->45:00:00:34:03:F0](    192.168.0.7->    192.168.0.7) TCP  [port:39456->   80][seq: 111382123][ack:3741049357]
0.000095: [40:00:40:06:AD:9C->45:00:00:34:7E:5D](    192.168.0.7->    192.168.0.7) TCP  [port:56192->  443][seq:1107714984][ack:3817127749]
0.000105: [40:00:40:06:05:F7->45:00:00:34:A7:C2](    192.168.0.7->    192.168.0.7) TCP  [port:49236->  443][seq:1763801532][ack:1413639304]
0.000112: [00:00:78:06:5B:AE->45:00:00:34:5A:0B]( 172.217.31.130-> 172.217.31.130) TCP  [port:  443->49236][seq:1413639304][ack:1780578748]
0.000120: [00:00:78:06:C8:86->45:00:00:34:6B:73]( 172.217.161.65-> 172.217.161.65) TCP  [port:  443->56192][seq:3817127749][ack:1124492200]
0.000134: [00:00:78:06:99:A1->45:00:00:34:33:D7](  216.58.220.97->  216.58.220.97) TCP  [port:   80->39456][seq:3741049357][ack: 128159339]
0.000180: [40:00:40:06:CD:EE->45:00:00:34:DF:9E](    192.168.0.7->    192.168.0.7) TCP  [port:60108->  443][seq: 643755561][ack:2165968821]
0.000212: [00:00:78:06:DC:B2->45:00:00:34:D8:DA]( 172.217.31.174-> 172.217.31.174) TCP  [port:  443->60108][seq:2165968821][ack: 660532777]
0.000221: [40:00:40:06:EC:B3->45:00:00:34:C6:84](    192.168.0.7->    192.168.0.7) TCP  [port:36960->  443][seq: 987123344][ack:3073889311]
0.000228: [40:00:40:06:C3:61->45:00:00:34:F1:58](    192.168.0.7->    192.168.0.7) TCP  [port:33608->  443][seq:1882845007][ack:1832695635]
0.000235: [00:00:78:06:3C:B0->45:00:00:34:80:0A]( 172.217.24.129-> 172.217.24.129) TCP  [port:  443->33608][seq:1832695635][ack:1899622223]
```

```
0.007158: [00:00:78:06:72:0B->45:00:01:AF:42:31]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:1614593080][ack:   3188816]
0.007169: [40:00:40:06:A3:57->45:00:00:34:0A:60](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack:3678256184]
0.007180: [00:00:78:06:6F:44->45:00:04:75:42:32]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:3678256184][ack:   3188816]
0.007193: [40:00:40:06:A3:56->45:00:00:34:0A:61](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack: 474135608]
0.007205: [00:00:78:06:DE:A0->45:00:00:7B:DD:D2]( 172.217.24.129-> 172.217.24.129) TCP  [port:  443->33608][seq:2487007059][ack:3980128079]
0.007217: [40:00:40:06:C3:5D->45:00:00:34:F1:5C](    192.168.0.7->    192.168.0.7) TCP  [port:33608->  443][seq:3980128079][ack:3678189395]
0.007229: [00:00:78:06:DA:30->45:00:04:EA:DD:D3]( 172.217.24.129-> 172.217.24.129) TCP  [port:  443->33608][seq:3678189395][ack:3980128079]
0.007241: [40:00:40:06:C3:5C->45:00:00:34:F1:5D](    192.168.0.7->    192.168.0.7) TCP  [port:33608->  443][seq:3980128079][ack:2437003091]
0.007254: [00:00:78:06:DE:C6->45:00:00:53:DD:D4]( 172.217.24.129-> 172.217.24.129) TCP  [port:  443->33608][seq:2437003091][ack:3980128079]
0.007266: [40:00:40:06:C3:5B->45:00:00:34:F1:5E](    192.168.0.7->    192.168.0.7) TCP  [port:33608->  443][seq:3980128079][ack:2957096787]
0.007279: [00:00:78:06:DE:BD->45:00:00:5B:DD:D5]( 172.217.24.129-> 172.217.24.129) TCP  [port:  443->33608][seq:2957096787][ack:3980128079]
0.007291: [40:00:40:06:C3:5A->45:00:00:34:F1:5F](    192.168.0.7->    192.168.0.7) TCP  [port:33608->  443][seq:3980128079][ack:3611408211]
0.007303: [40:00:40:06:C3:32->45:00:00:5B:F1:60](    192.168.0.7->    192.168.0.7) TCP  [port:33608->  443][seq:3980128079][ack:3611408211]
0.007314: [00:00:78:06:6D:F9->45:00:05:BE:42:34]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq: 474135608][ack:   3188816]
0.007327: [40:00:40:06:A3:55->45:00:00:34:0A:62](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack:2789719096]
0.007338: [00:00:78:06:6D:F8->45:00:05:BE:42:35]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:2789719096][ack:   3188816]
0.007351: [40:00:40:06:A3:54->45:00:00:34:0A:63](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack: 810400824]
0.007363: [00:00:78:06:6D:F7->45:00:05:BE:42:36]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq: 810400824][ack:   3188816]
0.007374: [40:00:40:06:A3:53->45:00:00:34:0A:64](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack:3125984312]
0.007385: [00:00:78:06:6D:F6->45:00:05:BE:42:37]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:3125984312][ack:   3188816]
0.007397: [40:00:40:06:A3:52->45:00:00:34:0A:65](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack:1146666040]
0.007408: [00:00:78:06:71:25->45:00:02:8E:42:38]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:1146666040][ack:   3188816]
0.007420: [40:00:40:06:A3:51->45:00:00:34:0A:66](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack:2656746552]
0.007431: [40:00:40:11:AC:91->45:00:00:48:57:35](    192.168.0.7->    192.168.0.7) UDP  [port:51263->   53]
0.007442: [40:00:40:11:AC:8B->45:00:00:4D:57:36](    192.168.0.7->    192.168.0.7) UDP  [port:47444->   53]
0.007452: [40:00:40:11:AC:8A->45:00:00:4D:57:37](    192.168.0.7->    192.168.0.7) UDP  [port:58995->   53]
0.007462: [40:00:F9:11:C2:EA->45:00:01:6A:86:B9]( 210.220.163.82-> 210.220.163.82) UDP  [port:   53->51263]
0.007472: [40:00:40:06:CB:1B->45:00:03:00:DF:A5](    192.168.0.7->    192.168.0.7) TCP  [port:60108->  443][seq:1348464169][ack: 371265461]
0.007484: [40:00:40:11:AC:86->45:00:00:4E:57:3A](    192.168.0.7->    192.168.0.7) UDP  [port:41344->   53]
0.007495: [40:00:F9:11:6A:4F->45:00:00:7C:E0:42]( 210.220.163.82-> 210.220.163.82) UDP  [port:   53->58995]
0.007506: [40:00:F9:11:83:43->45:00:00:79:C7:51]( 210.220.163.82-> 210.220.163.82) UDP  [port:   53->47444]
0.007517: [40:00:40:11:AC:89->45:00:00:4A:57:3B](    192.168.0.7->    192.168.0.7) UDP  [port:33524->   53]
0.007527: [40:00:40:11:AC:85->45:00:00:4D:57:3C](    192.168.0.7->    192.168.0.7) UDP  [port:46588->   53]
0.007538: [40:00:F9:11:F3:20->45:00:00:5D:57:90]( 210.220.163.82-> 210.220.163.82) UDP  [port:   53->46588]
0.007549: [40:00:F9:11:BA:ED->45:00:00:87:8F:99]( 210.220.163.82-> 210.220.163.82) UDP  [port:   53->41344]
0.007560: [40:00:F9:11:F2:FD->45:00:00:7E:57:92]( 210.220.163.82-> 210.220.163.82) UDP  [port:   53->33524]
0.007571: [40:00:40:06:73:89->45:00:00:3C:41:20](    192.168.0.7->    192.168.0.7) TCP  [port:35496->  443][seq:3409292379][ack:         0]
0.007583: [40:00:40:06:A1:D1->45:00:01:B3:0A:67](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:   3188816][ack:2656746552]
0.007595: [40:00:40:06:B1:43->45:00:00:3C:14:2B](    192.168.0.7->    192.168.0.7) TCP  [port:36160->  443][seq:2638868792][ack:         0]
0.007607: [00:00:78:06:DE:E0->45:00:00:34:DD:D9]( 172.217.24.129-> 172.217.24.129) TCP  [port:  443->33608][seq:3611408211][ack: 339537743]
0.007619: [00:00:78:06:6D:CE->45:00:05:BE:42:5F]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:2656746552][ack:   3188816]
0.007631: [40:00:40:06:A3:4F->45:00:00:34:0A:68](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:2133960784][ack: 677428280]
0.007643: [00:00:78:06:6D:CD->45:00:05:BE:42:60]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq: 677428280][ack:   3188816]
0.007654: [40:00:40:06:A3:4E->45:00:00:34:0A:69](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:2133960784][ack:2993011768]
0.007666: [00:00:78:06:6D:CC->45:00:05:BE:42:61]( 172.217.31.132-> 172.217.31.132) TCP  [port:  443->35444][seq:2993011768][ack:   3188816]
0.007678: [40:00:40:06:A3:4D->45:00:00:34:0A:6A](    192.168.0.7->    192.168.0.7) TCP  [port:35444->  443][seq:2133960784][ack:1013693496]
```



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