

2015 Advanced Computer Networks Homework 3

B013040033

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利用TCP Socket實作一個多人聊天室。

練習在 mininet 下執行這個程式。

1. Server: (70%)

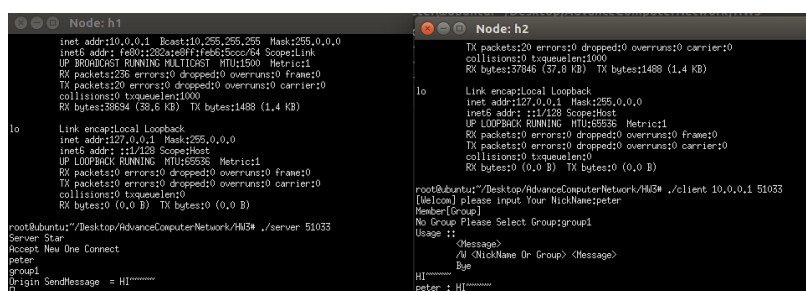
1. Use multi-thread to handle requests from clients.

```
while(1){  
  
    if ( (ClientDescriptor = accept(SockDescriptor, (struct sockaddr*)&client_addrIPv4, &cliAddressLen)) < 0)  
        perror("accept_error");exit(1);  
    }  
  
    printf("%s\n", "Accept New One Connect");  
    Member *temp = (Member *)malloc(sizeof(Member));  
    temp->fd = ClientDescriptor;  
    temp->prev=NULL;  
    temp->next=NULL;  
  
    pthread_create(&(temp->thread), &attr, &recv_from_client, (void *)temp );  
}
```

2. List all the members and chat room online, client can choose which room to join.

(if no group then user create group,

B0X3040ABC→5XABC B013040033 port is 51033)



The image shows two terminal windows. The left window, titled 'Node: h1', displays network statistics for interfaces 'lo' and 'eth0'. It shows metrics like 'TX packets', 'errors', 'dropped', 'overruns', 'carrier', 'collisions', 'txqueuelen', and 'RX bytes'. Below the statistics, it shows the command 'root@ubuntu:/Desktop/AdvanceComputerNetwork/AM3# ./server 51033' and the output 'Server Start' and 'Accept New One Connect'. The right window, titled 'Node: h2', shows similar network statistics for 'lo' and 'eth0'. Below the statistics, it shows the command 'root@ubuntu:/Desktop/AdvanceComputerNetwork/AM3# ./client 10.0.0.1 51033' and the output '[Welcome] please input Your NickName:peter', 'Member[Group]', 'No Group Please Select Group:group1', 'Usage :', ' <Message>', '/s <NickName Or Group> <Message>', 'Bye', 'HI', and 'peter : HI'.

H2建group1, H4建group2,H3加入group1

(List all the members and chat room online)

```
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HM3# ./server 51033
Server Star
Accept New One Connect
peter
group1
Origin SendMessage = HI*****
Accept New One Connect
alice
group2
Accept New One Connect
bom
group1
Origin SendMessage = HAAAAAAAAAAAAA
Origin SendMessage = /W peter GGGGGGGGGGGG
Origin SendMessage = /W group1 wwwwwwwwwwwwwwwwwww

root@ubuntu:~/Desktop/AdvanceComputerNetwork/HM3# ./client 10.0.0.1 51033
[Welcome] please input Your NickName:peter
Member[Group]
No Group Please Select Group:group1
Usage ::
    <Message>
    /W <NickName Or Group> <Message>
    Bye
HI*****
peter : HI*****
!!Server Note Client alice Login group2
!!Server Note Client bom Login group1
HAAAAAAAAAAAAA
peter : HAAAAAAAAAAAAA
alice : GGGGGGGGGGGG
alice : wwwwwwwwwwwwwwwwwww

Node: h3
TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:39333 (39.3 KB) TX bytes:1488 (1.4 KB)
Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
inet6 addr: ::1/128 Scope:Host
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HM3# ./client 10.0.0.1 51033
[Welcome] please input Your NickName:bom
Member[Group]
alice[group2],peter[group1], Please Select Group:group1
Usage ::
    <Message>
    /W <NickName Or Group> <Message>
    Bye
peter : HAAAAAAAAAAAAA
alice : wwwwwwwwwwwwwwwwwww

Node: h4
collisions:0 txqueuelen:1000
RX bytes:38052 (38.0 KB) TX bytes:1488 (1.4 KB)
Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
inet6 addr: ::1/128 Scope:Host
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HM3# ./client 10.0.0.1 51033
[Welcome] please input Your NickName:alice
Member[Group]
peter[group1], Please Select Group:group2
Usage ::
    <Message>
    /W <NickName Or Group> <Message>
    Bye
!!Server Note Client bom Login group1
/W peter GGGGGGGGGGGG
/W group1 wwwwwwwwwwwwwwwwwww
```

3. Handle clients request: (都同上圖)

i 訊息傳送給同一個群組下的成員。

H2 (peter) say HAAAAAAAAAAAAA , H3(bom)can listen it,H4 can not listen

ii 判斷訊息傳送的對象是人還是群組並將訊息傳給指定的人或者群組。

H4 say /W peter GGGGGGGGGGGG , H2 can listen

H4 say /W group1 wwwwwwwwwwwwwwwwwww , H2& H3can listen

iii 有人加入聊天室或者離開聊天室時,通知所有的成員。

H2(peter) say Bye ,other gets message !!Server Note Client peter Exit

```

Origin SendMessage = /W group1
End of while (recv)End of while (recv)Origin SendMessage = GGGGGGGGGG

Node: h3
UP LOOPBACK RUNNING: MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3# ./client 10.0.0.1 51033
[Welcome] please input Your NickName:bon
Member[Group]
alice[group2],peter[group1], Please Select Group:group1
Usage ::
    <Message>
    /W <NickName Or Group> <Message>
    Bye
    peter : HHHHHHHHHHHHHHHHH
    alice : HHHHHHHHHHHHHHHHH
    !!Server Note Client peter Exit
    !!Server Note Client alice Exit
    GGGGGGGGGG
    bon : GGGGGGGGGGG
    Bye
    !!Server Note Client bon Exit
    GoodBye
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3#

Node: h4
inet addr:192.0.0.1 Mask:255.0.0.0
inet6 addr: ::1:128 Scope:Host
UP LOOPBACK RUNNING: MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3# ./client 10.0.0.1 51033
[Welcome] please input Your NickName:alice
Member[Group]
peter[group1], Please Select Group:group2
Usage ::
    <Message>
    /W <NickName Or Group> <Message>
    Bye
    !!Server Note Client bon Login group1
    /W peter GGGGGGGGGGG
    /W group1 HHHHHHHHHHHHHHHHH
    !!Server Note Client peter Exit
    Bye
    !!Server Note Client alice Exit
    GoodBye
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3#

```

2. Client: (15%)前面的圖片皆有

Usage: ./client <Server IP> <Port number>

1. Connect to server.
2. Handle input:

i <Message>

訊息傳送給同一個群組下的成員

ii /W <Name or room> <Message>

判斷訊息傳送的對象是人還是群組並將訊息傳給指定的人或者群組

iii Bye

中斷連線

3. 執行環境: (15%)

練習在 mininet 下建立不只 2 個 host 並且可以互相 ping 到
建立

```

cpeter@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3$ sudo mn --topo single,4
*** Creating network
*** Adding controller
*** Adding hosts:
h1 h2 h3 h4
*** Adding switches:
s1
*** Adding links:
(h1, s1) (h2, s1) (h3, s1) (h4, s1)
*** Configuring hosts
h1 h2 h3 h4
*** Starting controller
*** Starting 1 switches
s1
*** Starting CLI:
mininet>

```

PingAll,net

```
cpeter@ubuntu: ~/Desktop/AdvanceComputerNetwork/HW3
s1
*** Adding links:
(h1, s1) (h2, s1) (h3, s1) (h4, s1)
*** Configuring hosts
h1 h2 h3 h4
*** Starting controller
*** Starting 1 switches
s1
*** Starting CLI:
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped (12/12 received)
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
h3 h3-eth0:s1-eth3
h4 h4-eth0:s1-eth4
s1 lo: s1-eth1:h1-eth0 s1-eth2:h2-eth0 s1-eth3:h3-eth0 s1-eth4:h4-eth0
c0
mininet>
```

Xterm

```
cpeter@ubuntu: ~/Desktop/AdvanceComputerNetwork/HW3#
h1 h2 h3 h4
*** Starting controller
*** Starting 1 switches
s1
*** Starting CLI:
mininet> pingall
*** Ping: testing ping r
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped
mininet> net
h1 h1-eth0:s1-eth1
h2 h2-eth0:s1-eth2
h3 h3-eth0:s1-eth3
h4 h4-eth0:s1-eth4
s1 lo: s1-eth1:h1-eth0 s1-eth2:h2-eth0 s1-eth3:h3-eth0 s1-eth4:h4-eth0
c0
mininet> xterm h1
mininet> xterm h2
mininet> xterm h3
mininet> xterm h4
mininet>
```

Ifconfig h1~h4 is 10.0.0.1~4

```
Node: h1
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3# ifconfig
h1-eth0  Link encap:Ethernet  HWaddr 2a:2a:e8:b6:5c:cc
          inet addr:10.0.0.1 Bcast:10.255.255.255 Mask:255.0.0.0
          inet6 addr: fe80::282a:e8ff:feb6:5ccc/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500 Metric:1
          RX packets:236 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:39694 (38.6 KB) TX bytes:1488 (1.4 KB)

lo       Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

Node: h2
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3# ifconfig
h2-eth0  Link encap:Ethernet  HWaddr 1a:2a:e8:b6:5c:cc
          inet addr:10.0.0.2 Bcast:10.255.255.255 Mask:255.0.0.0
          inet6 addr: fe80::181a:e8ff:feb6:5ccc/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500 Metric:1
          RX packets:231 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:37846 (37.8 KB) TX bytes:1488 (1.4 KB)

lo       Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

Node: h3
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3# ifconfig
h3-eth0  Link encap:Ethernet  HWaddr e6:38:21:8b:e9:08
          inet addr:10.0.0.3 Bcast:10.255.255.255 Mask:255.0.0.0
          inet6 addr: fe80::e438:21ff:fe8b:e908/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500 Metric:1
          RX packets:236 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:39694 (38.6 KB) TX bytes:1488 (1.4 KB)

lo       Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)

Node: h4
root@ubuntu:~/Desktop/AdvanceComputerNetwork/HW3# ifconfig
h4-eth0  Link encap:Ethernet  HWaddr 4a:2a:e8:b6:5c:cc
          inet addr:10.0.0.4 Bcast:10.255.255.255 Mask:255.0.0.0
          inet6 addr: fe80::4a2a:e8ff:feb6:5ccc/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500 Metric:1
          RX packets:232 errors:0 dropped:0 overruns:0 frame:0
          TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:37846 (37.8 KB) TX bytes:1488 (1.4 KB)

lo       Link encap:Local Loopback
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
```