

step1、step3

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server.cpp - Visual Studio Code
檔案 編輯 選取項目 檢視 移至 執行 終端機 說明
同題 輸出 終端機 偵錯主控台
+ ~ cd Desktop/computer
+ computer make
g++ -o server server.cpp
g++ -o client client.cpp
+ computer ./server 1234
====Parameter====
RTT : 15 ms
threshold : 65536 bytes
MSS : 1624 bytes
buffer size : 524288 bytes
Server's IP is 127.0.0.1
Server is listening on port 0
====
Listening for client...
====Start the three-way handshake====
Receive a packet (seq num = 4154 , ack_num = 0)
Send a packet (seq num = 1136 , ack_num = 4155)
Receive a packet (seq num = 4155 , ack_num = 1137)
====Complete the three-way handshake====
+ computer ./client
====start the three-way handshake====
Send a packet(SYN) to 0.0.0.0 : 1234
packet(seq) : 4154
Receive a packet(SYN/ACK) from 0.0.0.0 : 1234
Receive a packet (seq num = 1136,ack_num = 4155 )
Send a packet to 0.0.0.0 : 1234
====complete the three-way handshake====
input request (DNS/math/trans)

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+ computer make
g++ -o server server.cpp
g++ -o client client.cpp
+ computer ./server 1234
====Parameter====
RTT : 15 ms
threshold : 65536 bytes
MSS : 1624 bytes
buffer size : 524288 bytes
Server's IP is 127.0.0.1
Server is listening on port 0
====
Listening for client...
====Start the three-way handshake====
Receive a packet (seq num = 7038 , ack_num = 0)
Send a packet (seq num = 7583 , ack_num = 7039)
Receive a packet (seq num = 7039 , ack_num = 7584)
====Complete the three-way handshake====
Receive a packet (seq num = 0 , ack_num = 0)
====DNS====
Receive a packet (seq_num = 15 , ack_num = 84)
====Finish====
Receive a packet (seq_num = 0 , ack_num = 0)
====math====
Receive a packet (seq_num = 16 , ack_num = 14)
====Finish====
Receive a packet (seq_num = 0 , ack_num = 0)
====math====
Receive a packet (seq_num = 16 , ack_num = 14)
====Finish====
Receive a packet (seq_num = 0 , ack_num = 0)
====math====
Receive a packet (seq_num = 15 , ack_num = 13)
====Finish====
Receive a packet (seq_num = 0 , ack_num = 0)
====math====
Receive a packet (seq_num = 15 , ack_num = 12)
====Finish====
Receive a packet (seq_num = 0 , ack_num = 0)
====math====
Receive a packet (seq_num = 14 , ack_num = 12)
====Finish====
Receive a packet (seq_num = 0 , ack_num = 0)
====math====
Receive a packet (seq_num = 15 , ack_num = 14)
====Finish====
+ computer ./client
====start the three-way handshake====
Send a packet(SYN) to 0.0.0.0 : 1234
packet(seq) : 7038
Receive a packet(SYN/ACK) from 0.0.0.0 : 1234
Receive a packet (seq num = 7583,ack_num = 7039 )
Send a packet to 0.0.0.0 : 1234
====complete the three-way handshake====
input request (DNS/math/trans)
DNS google.com
Receive a packet (seq_num = 0 ),(ack_num = 15)
IP addresses for google.com:
IPv4 : 172.217.160.78
IPv6 : 2404:6800:4008:801::200e
input request (DNS/math/trans)
math add,33,25
Receive a packet (seq_num = 0 ),(ack_num = 16)
33 + 25 = 58
input request (DNS/math/trans)
math sub,57,25
Receive a packet (seq_num = 0 ),(ack_num = 16)
57 - 25 = 32
input request (DNS/math/trans)
math mul,27,3
Receive a packet (seq_num = 0 ),(ack_num = 15)
27 * 3 = 81
input request (DNS/math/trans)
math div,64,8
Receive a packet (seq_num = 0 ),(ack_num = 15)
64 / 8 = 8
input request (DNS/math/trans)
math pow,2,5
Receive a packet (seq_num = 0 ),(ack_num = 14)
2 ^ 5 = 32
input request (DNS/math/trans)
math sqr,25,2
Receive a packet (seq_num = 0 ),(ack_num = 15)
25 sqr 2 = 5
input request (DNS/math/trans)

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Receive a packet (seq_num = 0 , ack_num = 0)
====transmission file====
send a packet at : 0 bytes
Receive a packet (seq_num = 16 , ack_num = 9)
send a packet at : 9 bytes
Receive a packet (seq_num = 17 , ack_num = 130)
====Finish====
input request (DNS/math/trans)
trans Makefile
Receive a packet (seq_num = 0 ),(ack_num = 16)
Receiving file : Makefile....
Receive a packet (seq_num = 9 ),(ack_num = 17)
file accept : Makefile
input request (DNS/math/trans)

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step2

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server.cpp - Visual Studio Code

檔案 編輯 選取項目 檢視 移至 執行 終端機 說明

問題 輸出 終端機 伺服器控制台

+ ~ cd Desktop/computer
+ computer make
g++ -o server server.cpp
g++ -o client client.cpp
+ computer ./server 1234
=====Parameter=====
RTT : 15 ms
threshold : 65536 bytes
MSS : 1824 bytes
buffer size : 524288 bytes
Server's IP is 127.0.0.1
Server is listening on port 0
=====
Listening for client...
=====Start the three-way handshake=====
Receive a packet (seq num = 7017 , ack num = 0)
Send a packet (seq num = 3345 ,ack num = 7018)
Receive a packet (seq num = 7018 , ack num = 3346)
=====Complete the three-way handshake=====
=====Start the three-way handshake=====
Receive a packet (seq num = 7979 , ack num = 0)
Send a packet (seq num = 3345 ,ack num = 7980)
Receive a packet (seq num = 7980 , ack num = 3346)
=====Complete the three-way handshake=====

+ computer ./client
=====start the three-way handshake=====
Send a packet(SYN) to 0.0.0.0 : 1234
packet(seq) : 7017
Receive a packet(SYN/ACK) from 0.0.0.0 : 1234
Receive a packet (seq num = 3345,ack_num = 7018 )
Send a packet to 0.0.0.0 : 1234
=====Complete the three-way handshake=====
input request (DNS/math/trans)

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檔案 編輯 選取項目 檢視 移至 執行 終端機 說明

問題 輸出 終端機 伺服器控制台

+ ~ cd Desktop/computer
+ computer make
g++ -o server server.cpp
g++ -o client client.cpp
+ computer ./server 1234
=====Parameter=====
RTT : 15 ms
threshold : 65536 bytes
MSS : 1824 bytes
buffer size : 524288 bytes
Server's IP is 127.0.0.1
Server is listening on port 0
=====
Listening for client...
=====Start the three-way handshake=====
Receive a packet (seq num = 7017 , ack num = 0)
Send a packet (seq num = 3345 ,ack num = 7018)
Receive a packet (seq num = 7018 , ack num = 3346)
=====Complete the three-way handshake=====
=====Start the three-way handshake=====
Receive a packet (seq num = 7979 , ack num = 0)
Send a packet (seq num = 3345 ,ack num = 7980)
Receive a packet (seq num = 7980 , ack num = 3346)
=====Complete the three-way handshake=====
Receive a packet (seq num = 0 , ack num = 0)
=====math=====
Receive a packet (seq num = 14 , ack num = 11)
=====Finish=====
Receive a packet (seq num = 0 , ack num = 0)
=====DNS=====
Receive a packet (seq num = 15 , ack num = 84)
=====Finish=====

+ computer ./client
=====start the three-way handshake=====
Send a packet(SYN) to 0.0.0.0 : 1234
packet(seq) : 7017
Receive a packet(SYN/ACK) from 0.0.0.0 : 1234
Receive a packet (seq num = 3345,ack_num = 7018 )
Send a packet to 0.0.0.0 : 1234
=====complete the three-way handshake=====
input request (DNS/math/trans)
math add 1,1
Receive a packet (seq num = 0 ),(ack num = 14)
1 + 1 = 2
input request (DNS/math/trans)

+ computer ./client
=====start the three-way handshake=====
Send a packet(SYN) to 0.0.0.0 : 1234
packet(seq) : 7979
Receive a packet(SYN/ACK) from 0.0.0.0 : 1234
Receive a packet (seq num = 3345,ack_num = 7980 )
Send a packet to 0.0.0.0 : 1234
=====complete the three-way handshake=====
input request (DNS/math/trans)
DNS google.com
Receive a packet (seq num = 0 ),(ack num = 15)
IP addresses for google.com:
IPv4 : 216.58.200.238
IPv6 : 2404:6800:4008:803::200e
input request (DNS/math/trans)

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step4

server.cpp - Visual Studio Code

檔案 編輯 選取項目 檢視 移至 執行 終端機 說明

問題 輸出 終端機 偵錯主控台

1: ./serve

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send a packet at : 3208198 bytes
Receive a packet (seq_num = 3147 , ack_num = 3289222)
detect loss at 3209222byte
send a packet at : 3210246 bytes
Receive a packet (seq_num = 3149 , ack_num = 3211270)
send a packet at : 3211270 bytes
Receive a packet (seq_num = 3150 , ack_num = 3212294)
send a packet at : 3212294 bytes
Receive a packet (seq_num = 3151 , ack_num = 3213318)
send a packet at : 3213318 bytes
Receive a packet (seq_num = 3152 , ack_num = 3214342)
send a packet at : 3214342 bytes
Receive a packet (seq_num = 3153 , ack_num = 3215366)
send a packet at : 3215366 bytes
Receive a packet (seq_num = 3154 , ack_num = 3216390)
send a packet at : 3216390 bytes
Receive a packet (seq_num = 3155 , ack_num = 3217414)
send a packet at : 3217414 bytes
Receive a packet (seq_num = 3156 , ack_num = 3218438)
send a packet at : 3218438 bytes
Receive a packet (seq_num = 3157 , ack_num = 3219462)
send a packet at : 3219462 bytes
Receive a packet (seq_num = 3158 , ack_num = 3220486)
detect loss at 3220486byte
send a packet at : 3221510 bytes
Receive a packet (seq_num = 3160 , ack_num = 3222534)
send a packet at : 3222534 bytes
Receive a packet (seq_num = 3161 , ack_num = 3223558)
send a packet at : 3223558 bytes
Receive a packet (seq_num = 3162 , ack_num = 3224582)
send a packet at : 3224582 bytes
Receive a packet (seq_num = 3163 , ack_num = 3225606)
send a packet at : 3225606 bytes
Receive a packet (seq_num = 3164 , ack_num = 3226630)
send a packet at : 3226630 bytes
Receive a packet (seq_num = 3165 , ack_num = 3227654)
send a packet at : 3227654 bytes
Receive a packet (seq_num = 3166 , ack_num = 3228678)
send a packet at : 3228678 bytes
Receive a packet (seq_num = 3167 , ack_num = 3229702)
detect loss at 3229702byte
send a packet at : 3230726 bytes
Receive a packet (seq_num = 3169 , ack_num = 3231750)
send a packet at : 3231750 bytes
Receive a packet (seq_num = 3170 , ack_num = 3232774)
send a packet at : 3232774 bytes
Receive a packet (seq_num = 3171 , ack_num = 3233798)
send a packet at : 3233798 bytes
Receive a packet (seq_num = 3172 , ack_num = 3234822)
send a packet at : 3234822 bytes
Receive a packet (seq_num = 3173 , ack_num = 3235846)
send a packet at : 3235846 bytes
Receive a packet (seq_num = 3174 , ack_num = 3236870)
send a packet at : 3236870 bytes
Receive a packet (seq_num = 3175 , ack_num = 3237894)
send a packet at : 3237894 bytes
Receive a packet (seq_num = 3176 , ack_num = 3238918)
send a packet at : 3238918 bytes
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檔案 編輯 選取項目 檢視 移至 執行 終端機 說明

問題 輸出 終端機 偵錯主控台

1: ./s

```
Receive a packet (seq_num = 3667 , ack_num = 3741702)
send a packet at : 3741702 bytes
Receive a packet (seq_num = 3668 , ack_num = 3742726)
send a packet at : 3742726 bytes
Receive a packet (seq_num = 3669 , ack_num = 3743750)
send a packet at : 3743750 bytes
Receive a packet (seq_num = 3670 , ack_num = 3744774)
send a packet at : 3744774 bytes
Receive a packet (seq_num = 3671 , ack_num = 3745798)
send a packet at : 3745798 bytes
Receive a packet (seq_num = 3672 , ack_num = 3746822)
send a packet at : 3746822 bytes
Receive a packet (seq_num = 3673 , ack_num = 3747846)
send a packet at : 3747846 bytes
Receive a packet (seq_num = 3674 , ack_num = 3748870)
detect loss at 3748870byte
send a packet at : 3749894 bytes
Receive a packet (seq_num = 3676 , ack_num = 3750918)
send a packet at : 3750918 bytes
Receive a packet (seq_num = 3677 , ack_num = 3751942)
send a packet at : 3751942 bytes
Receive a packet (seq_num = 3678 , ack_num = 3752966)
send a packet at : 3752966 bytes
Receive a packet (seq_num = 3679 , ack_num = 3753990)
send a packet at : 3753990 bytes
Receive a packet (seq_num = 3680 , ack_num = 3755014)
send a packet at : 3755014 bytes
Receive a packet (seq_num = 3681 , ack_num = 3756038)
send a packet at : 3756038 bytes
Receive a packet (seq_num = 3682 , ack_num = 3757062)
send a packet at : 3757062 bytes
Receive a packet (seq_num = 3683 , ack_num = 3758086)
send a packet at : 3758086 bytes
Receive a packet (seq_num = 3684 , ack_num = 3759110)
send a packet at : 3759110 bytes
Receive a packet (seq_num = 3685 , ack_num = 3760134)
send a packet at : 3760134 bytes
Receive a packet (seq_num = 3686 , ack_num = 3761158)
send a packet at : 3761158 bytes
Receive a packet (seq_num = 3687 , ack_num = 3762182)
send a packet at : 3762182 bytes
Receive a packet (seq_num = 3688 , ack_num = 3763206)
send a packet at : 3763206 bytes
Receive a packet (seq_num = 3689 , ack_num = 3764230)
send a packet at : 3764230 bytes
Receive a packet (seq_num = 3690 , ack_num = 3765254)
send a packet at : 3765254 bytes
Receive a packet (seq_num = 3691 , ack_num = 3766278)
detect loss at 3766278byte
send a packet at : 3767302 bytes
Receive a packet (seq_num = 3693 , ack_num = 3768326)
send a packet at : 3768326 bytes
Receive a packet (seq_num = 3694 , ack_num = 3769350)
send a packet at : 3769350 bytes
Receive a packet (seq_num = 3695 , ack_num = 3770374)
====Finish====

file accept : 1.mp4

input request (DNS/math/trans)
```

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