

实现要求：

1. 能同时接受多个客户端的连接
2. 将任意一个客户端发送的文本向所有客户端（包括发送方）转发

实现细节：

启动服务器

```
public static void main(String[] args) throws IOException{
    // 建立服务端的socket
    ServerSocket s = new ServerSocket(PORT);
    System.out.println("Sever Starting...");
    try {
        while (true) {
            // 等待客户端连接
            Socket socket = s.accept();
            System.out.println("Connect to Client : ");
            try {
                // 建立一个线程去处理该客户端的请求
                JabberServer clientThread = new JabberServer(socket);
                // 运行该线程
                clientThread.start();
                // 加入到客户端队列
                listClient.add(clientThread);
            } catch (IOException e) {
                socket.close();
            }
        }
    }
    finally{
        s.close();
    }
}
```

对接单个客户端的线程：

```
static class JabberServer extends Thread {
    private Socket socket;
    private BufferedReader in;
    private PrintWriter out;
    public String username;
    Server server = new Server();

    public JabberServer(Socket s) throws IOException{
        socket = s;
        in = new BufferedReader(new
InputStreamReader(socket.getInputStream()));
        out = new PrintWriter(new BufferedWriter(new
OutputStreamWriter(socket.getOutputStream()),true));
    }

    public void run(){
        ...
    }
}
```

客户端连接上服务器之后的提示语：

```
try {

    out.println("Pleanning enter username: ");
    this.username = in.readLine();
    out.println("Hi " +this.username + "! Let's start chatting :P");
    out.println("*****");
    // 发送给所有连接上的客户端，有新的客户端连接上
    for(JabberServer Client:listClient ){
        if(this == Client )
            continue;
        new SendMsg("what's up guys!", Client.socket,this).start();
    }
}
```

其中JabberServer的run函数会等待用户输入，然后将消息打印在服务器、广播给其他客户端，最后打印在自己的客户端。这样的消息显示循序在现实应用中十分重要，因为聊天消息一般先发送给其他客户端，等到其他客户端都收到之后，才在自己的客户端显示自己的消息。

```
while(true){
    System.out.println("There is(are) " + listClient.size() + "
Client(s)");
    System.out.println("*****");
}
```

```

String line = in.readLine();
if(line.equals("END"))
    break;
// 服务器显示信息
System.out.println(this.username + " says: " + line);
// 广播
for(JabberServer client : listClient){
    if(client == this)
        continue;
    // 指定是this这个客户端
    new SendMsg(line, client.socket, this).start();
}
// 在客户端显示
out.println("my message: " + line);
}

```

发送消息的线程:

```

static class SendMsg extends Thread {
    Socket socket;
    String msg;
    String username;
    private BufferedReader in;
    private PrintWriter out;

    public SendMsg(String msg, Socket socket, JabberServer client) throws
IOException {
        this.socket = socket;
        this.msg = msg;
        this.username = client.username;
        in = new BufferedReader(new
InputStreamReader(socket.getInputStream()));
        out = new PrintWriter(new BufferedWriter(new
OutputStreamWriter(socket.getOutputStream()),true));
    }
    public void run(){
        super.run();
        // 在各自客户端发送消息
        out.println(username + ": " +msg);
    }
}

```

功能展示：

如何运行：

```
java -jar P3_chatting_bot.jar
```

```
(base) → P3_chatting_bot java -jar P3_chatting_bot.jar  
Sever Starting...
```

如上图，服务器已经开启，服务器的端口号设置的是8080

开启客户端

首先用nc连接服务器，测试消息转发情况：

```
nc localhost 8080
```

```
(base) → ~ nc localhost 8080  
Pleaining enter username:
```

会要求输入一个用户名（测试中输入t1作为用户名）

```
(base) → ~ nc localhost 8080  
Pleaining enter username:  
t1  
Hi t1! Let's start chatting :P  
*****
```

会有一句欢迎语句，然后就等待用户输入。

此时开启另一个客户端（取名为t2）

```
(base) → ~ nc localhost 8080  
Pleaining enter username:  
t2  
Hi t2! Let's start chatting :P  
*****
```

此时t1会收到t2开启的消息：

```
(base) → ~ nc localhost 8080
Please enter username:
t1
Hi t1! Let's start chatting :P
*****
t2: what's up guys!
```

同时，服务器会有连接客户端数量的记录

```
(base) → P3_chatting_bot java -jar P3_chatting_bot.jar
Server Starting...
Connect to Client :
There is(are) 1 Client(s)
*****
Connect to Client :
There is(are) 2 Client(s)
*****
```

客户端之间发送消息

为验证多个客户端的效果，再开启一个客户端t3:

```
(base) → ~ nc localhost 8080
Please enter username:
t3
Hi t3! Let's start chatting :P
*****
```

首先t1发送一则消息，服务器会显示t1发送的内容，t2和t3会收到t1以及它发送的消息。最后，t1自己会收到自己消息的提示语my message

```
java (java) nc (nc)

[oh-my-zsh] compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → P3_chatting_bot java -jar P3_chatting_bot.jar
Sever Starting...
Connect to Client :
There is(are) 1 Client(s)
*****
Connect to Client :
There is(are) 2 Client(s)
*****
Connect to Client :
There is(are) 3 Client(s)
*****
t1 says: hello, I am t1.
There is(are) 3 Client(s)
*****
[]

[oh-my-zsh] To fix your permissions you can do so by disabling
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh] compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t1
Hi t1! Let's start chatting :P
*****
t2: what's up guys!
t3: what's up guys!
hello, I am t1.
my message: hello, I am t1.
[]

nc (nc) nc (nc)

[oh-my-zsh] For safety, we will not load completions from these directories until
[oh-my-zsh] you fix their permissions and ownership and restart zsh.
[oh-my-zsh] See the above list for directories with group or other writability.

[oh-my-zsh] To fix your permissions you can do so by disabling
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh] compaudit | xargs chmod g-w,o-w

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[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t3
Hi t3! Let's start chatting :P
*****
t1: hello, I am t1.
[]

[oh-my-zsh] To fix your permissions you can do so by disabling
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh] compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ 女.
zsh: command not found: 女.
(base) → ~ nc localhost 8080
Pleaining enter username:
t2
Hi t2! Let's start chatting :P
*****
t3: what's up guys!
t1: hello, I am t1.
[]
```

同样的，t2发送消息。其他的客户端以及t2自己会收到消息。

```
java (java) nc (nc)

[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → P3_chatting_bot java -jar P3_chatting_bot.jar
Sever Starting...
Connect to Client :
There is(are) 1 Client(s)
*****
Connect to Client :
There is(are) 2 Client(s)
*****
Connect to Client :
There is(are) 3 Client(s)
*****
t1 says: hello, I am t1.
There is(are) 3 Client(s)
*****
t2 says: hi, it's t2
There is(are) 3 Client(s)
*****
[]

[oh-my-zsh] To fix your permissions you can do so by disabling
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh] compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t1
Hi t1! Let's start chatting :P
*****
t2: what's up guys!
t3: what's up guys!
hello, I am t1.
my message: hello, I am t1.
t2: hi, it's t2
[]

nc (nc) nc (nc)

[oh-my-zsh] you fix their permissions and ownership and restart zsh.
[oh-my-zsh] See the above list for directories with group or other writability.

[oh-my-zsh] To fix your permissions you can do so by disabling
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[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t3
Hi t3! Let's start chatting :P
*****
t1: hello, I am t1.
t2: hi, it's t2
[]

[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh] compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ 女.
zsh: command not found: 女.
(base) → ~ nc localhost 8080
Pleaining enter username:
t2
Hi t2! Let's start chatting :P
*****
t3: what's up guys!
t1: hello, I am t1.
hi, it's t2
my message: hi, it's t2
[]
```

类似的，t3发送消息，其他客户端和t3自己会收到消息。

```
java (java)
(base) → P3_chatting_bot java -jar P3_chatting_bot.jar
Server Starting...
Connect to Client :
There is(are) 1 Client(s)
*****
Connect to Client :
There is(are) 2 Client(s)
*****
Connect to Client :
There is(are) 3 Client(s)
*****
t1 says: hello, I am t1.
There is(are) 3 Client(s)
*****
t2 says: hi, it's t2
There is(are) 3 Client(s)
*****
t3 says: Hi there, I am t3
There is(are) 3 Client(s)
*****
[]

nc (nc)
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh]     compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t1
Hi t1! Let's start chatting :P
*****
t2: what's up guys!
t3: what's up guys!
hello, I am t1.
my message: hello, I am t1.
t2: hi, it's t2
t3: Hi there, I am t3
[]

nc (nc)
[oh-my-zsh] To fix your permissions you can do so by disabling
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh]     compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t2
Hi t3! Let's start chatting :P
*****
t1: hello, I am t1.
t2: hi, it's t2
Hi there, I am t3
my message: Hi there, I am t3
[]

nc (nc)
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh]     compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ 女、
zsh: command not found: 女、
(base) → ~ nc localhost 8080
Pleaining enter username:
t2
Hi t2! Let's start chatting :P
*****
t3: what's up guys!
t1: hello, I am t1.
hi, it's t2
my message: hi, it's t2
t3: Hi there, I am t3
[]
```

断开连接

客户端输入END即可断开与服务器的连接，同时其他的客户端会收到消息。

```
java (java)
There is(are) 1 Client(s)
*****
Connect to Client :
There is(are) 2 Client(s)
*****
Connect to Client :
There is(are) 3 Client(s)
*****
t1 says: hello, I am t1.
There is(are) 3 Client(s)
*****
t2 says: hi, it's t2
There is(are) 3 Client(s)
*****
t3 says: Hi there, I am t3
There is(are) 3 Client(s)
*****
closing t3
There is(are) 2 Client(s)
*****
[]

~ (-zsh)
[oh-my-zsh] To fix your permissions you can do so by disabling
[oh-my-zsh] the write permission of "group" and "others" and making sure that the
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh]     compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t3
Hi t3! Let's start chatting :P
*****
t1: hello, I am t1.
t2: hi, it's t2
Hi there, I am t3
my message: Hi there, I am t3
END
(base) → ~

nc (nc)
[oh-my-zsh] owner of these directories is either root or your current user.
[oh-my-zsh] The following command may help:
[oh-my-zsh]     compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ nc localhost 8080
Pleaining enter username:
t1
Hi t1! Let's start chatting :P
*****
t2: what's up guys!
t3: what's up guys!
hello, I am t1.
my message: hello, I am t1.
t2: hi, it's t2
t3: Hi there, I am t3
t3: leave this room
[]

~ (-zsh)
[oh-my-zsh] The following command may help:
[oh-my-zsh]     compaudit | xargs chmod g-w,o-w

[oh-my-zsh] If the above didn't help or you want to skip the verification of
[oh-my-zsh] insecure directories you can set the variable ZSH_DISABLE_COMPFIFX to
[oh-my-zsh] "true" before oh-my-zsh is sourced in your zshrc file.

(base) → ~ 女、
zsh: command not found: 女、
(base) → ~ nc localhost 8080
Pleaining enter username:
t2
Hi t2! Let's start chatting :P
*****
t3: what's up guys!
t1: hello, I am t1.
hi, it's t2
my message: hi, it's t2
t3: Hi there, I am t3
t3: leave this room
[]
```

客户端测试代码（借用老师的课程示例代码）

```
java (java)
There is(are) 3 Client(s)
*****
Client 18 says: Client 18: 20
There is(are) 3 Client(s)
*****
Client 18 says: Client 18: 21
There is(are) 3 Client(s)
*****
Client 18 says: Client 18: 22
There is(are) 3 Client(s)
*****
Client 18 says: Client 18: 23
There is(are) 3 Client(s)
*****
Client 18 says: Client 18: 24
There is(are) 3 Client(s)
*****
closing Client 18
There is(are) 2 Client(s)
*****
[]

nc (nc)
Client 17: leave this room
Client 18: what's up guys!
Client 18: Client 18: 0
Client 18: Client 18: 1
Client 18: Client 18: 2
Client 18: Client 18: 3
Client 18: Client 18: 4
Client 18: Client 18: 5
Client 18: Client 18: 6
Client 18: Client 18: 7
Client 18: Client 18: 8
Client 18: Client 18: 9
Client 18: Client 18: 10
Client 18: Client 18: 11
Client 18: Client 18: 12
Client 18: Client 18: 13
Client 18: Client 18: 14
Client 18: Client 18: 15
Client 18: Client 18: 16
Client 18: Client 18: 17
Client 18: Client 18: 18

nc (nc)
Client 17: Client 17: 19
Client 17: Client 17: 20
Client 17: Client 17: 21
Client 17: Client 17: 22
Client 17: Client 17: 23
Client 17: Client 17: 24
Client 17: leave this room
Client 18: what's up guys!
Client 18: Client 18: 0
Client 18: Client 18: 1
Client 18: Client 18: 2
Client 18: Client 18: 3
Client 18: Client 18: 4
Client 18: Client 18: 5
Client 18: Client 18: 6
Client 18: Client 18: 7
Client 18: Client 18: 8
Client 18: Client 18: 9
Client 18: Client 18: 10
Client 18: Client 18: 11
Client 18: Client 18: 12

java (java)
my message: Client 17: 16
my message: Client 17: 17
my message: Client 17: 18
my message: Client 17: 19
my message: Client 17: 20
my message: Client 17: 21
Making client 18
Pleaseing enter username:
Hi Client 18! Let's start chatting :P
*****
my message: Client 18: 0
my message: Client 18: 1
my message: Client 18: 2
my message: Client 18: 3
my message: Client 18: 4
my message: Client 18: 5
my message: Client 18: 6
my message: Client 18: 7
my message: Client 18: 8
my message: Client 18: 9
my message: Client 18: 10
```

发现服务端和客户端可以正常收发消息。