Java Project2 Report

Chapter1 问题描述

实现一个多客户端的纯文本聊天服务器，能同时接受多个客户端的连接，并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。

Chapter2 实验过程

实验环境：

> Windows/WSL
>
> IDEA
>
> openjdk version "11.0.12"

- `Server` 类：服务器
  - 成员变量

```
1       public final ServerSocket;
2       public final Thread connecter;
3       public final Thread sender;
4       public static final int PORT = 8080;
```

  - 默认端口 `8080`

```
1   public static final int PORT = 8080;
```

  - 根据端口新建一个 `ServerSocket`

```
1   public final ServerSocket serverSocket = new ServerSocket(PORT);
```

  - `Server` 的构造函数

```
1   public Server() throws IOException {
2           List<ConnectClient> connectClients = new ArrayList<>(); // 连接上的客户端
3           List<String> msgs = new ArrayList<>(); // msgs为待传输的消息队列
4           connecter = new Connecter(this.serverSocket, connectClients, msgs); // 监听是否有客户端连接
5           sender = new Sender(connectClients, msgs); // 监听是否有消息要发送
6           connecter.start();
7           sender.start();
8           System.out.println("connect success: " + serverSocket);
9       }
```

  - 将信息发送给所有的客户端
    - `List<String> Msgs` 为等待的消息队列
    - 唤醒等待的所有线程

```
    public static void SendToAll(List<String> Msgs) {
            synchronized (Msgs) {
                Msgs.notifyAll();
            }
        }
```

- `ConnectClient`类：服务器连接的客户端
  - 成员变量

```
        public int no;
        public String nickname = null;
        private final Socket socket;
        public final PrintWriter printWriter;
        public final BufferedReader bufferedReader;
        public final List<String> Msgs; // 待传输的消息队列
```

  - 接收客户端发来的消息
    - 如果结尾是`BYE`则退出
    - 将待发送的消息加入消息队列

```
        while (true) {
                String r = null;
                try {
                    r = bufferedReader.readLine();
                } catch (IOException e) {
                    // throw new RuntimeException(e);
                    System.out.println(e);
                    break;
                }
                if (r.equals("BYE")) {
                    Msgs.add("[NOTICE]: " + this.nickname + " left the chatting room");
                    Server.SendToAll(Msgs);
                    printWriter.println("BYE");
                    printWriter.println("END");
                    break;
                }
                System.out.println(this.nickname + " send: " + r); // delete while submit
                String sendMsg = this.nickname + ": " + r;
                synchronized (Msgs) {
                    Msgs.add(sendMsg);
                    Msgs.notifyAll();
                }
            }
```

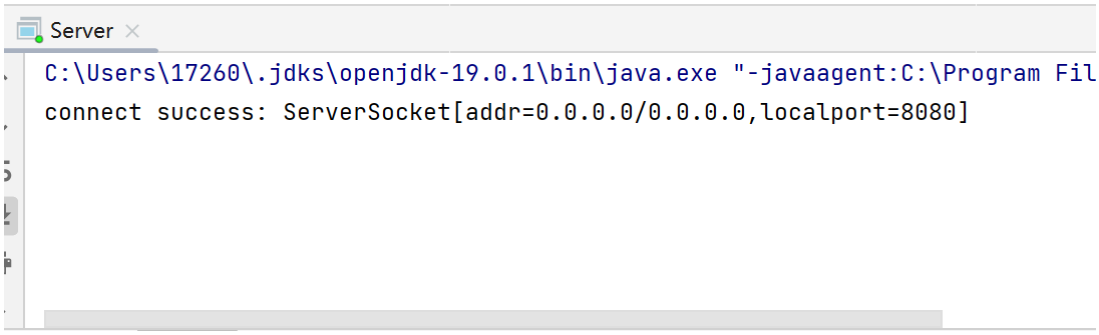
- `Connecter`类：连接客户端和服务器，启动
- `Sender`类
  - 发送消息到客户端
    - 从消息队列中取出一个字符串，通过printWriter打印在客户端

```
    while (true) {
                String now = null;
                synchronized (Msgs) {
                    if(Msgs.isEmpty()) {
```

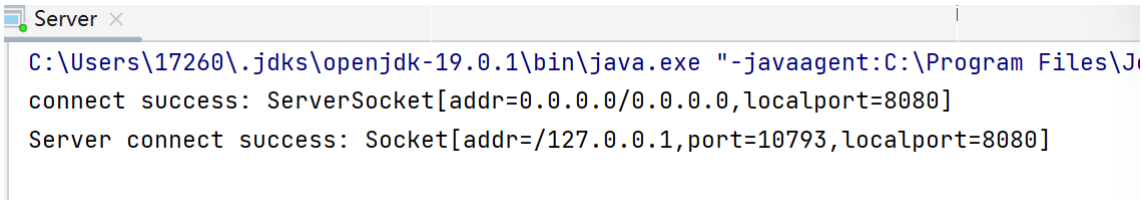
```
                    try {
                        Msgs.wait();
                    } catch (InterruptedException ignored) {
                    }
                }else {
                    now = deq(Msgs);
                }
            }
            if(now != null) {
                for(ConnectClient connectClient : connectClients) {
                    connectClient.printWriter.println(now);
                }
            }
        }
```

Chapter3 测试

运行server：

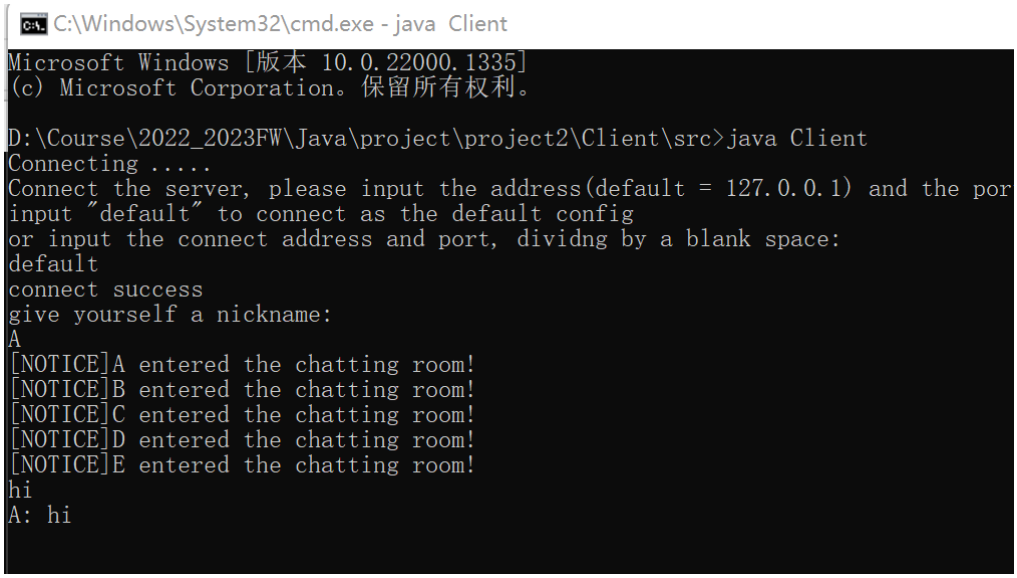


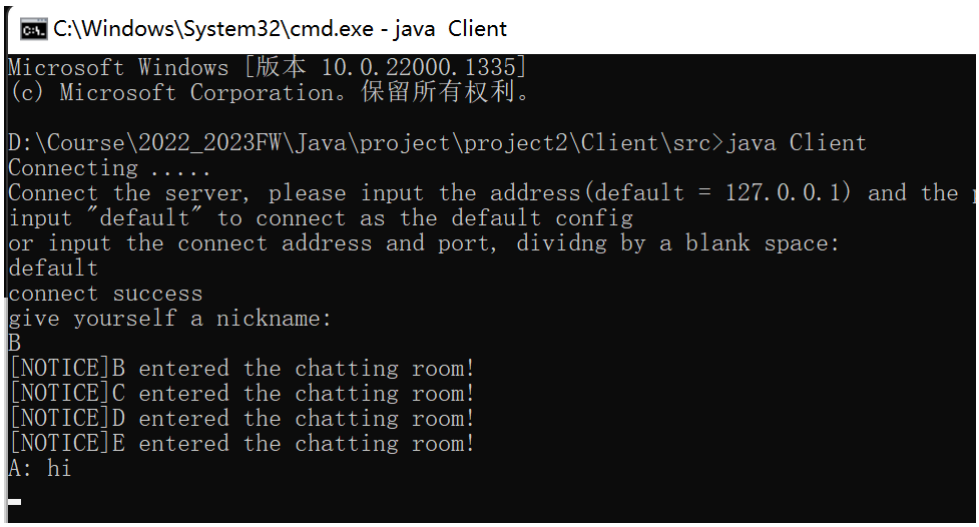
连接：

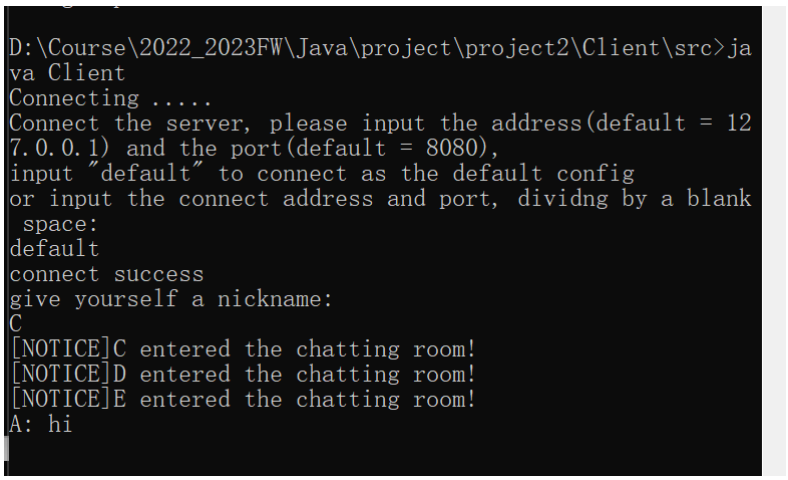


用客户端程序进行测试（连接了5个客户端）

- A发送消息，此时所有客户端都可以收到消息




C:\Windows\System32\cmd.exe - java Client
Microsoft Windows [版本 10.0.22000.1335]
(c) Microsoft Corporation。保留所有权利。
D:\Course\2022_2023FW\Java\project\project2\Client\src>java Client
Connecting .....
Connect the server, please input the address(default = 127.0.0.1) and the
input "default" to connect as the default config
or input the connect address and port, dividng by a blank space:
default
connect success
give yourself a nickname:
B
[NOTICE]B entered the chatting room!
[NOTICE]C entered the chatting room!
[NOTICE]D entered the chatting room!
[NOTICE]E entered the chatting room!
A: hi


D:\Course\2022_2023FW\Java\project\project2\Client\src>ja
va Client
Connecting .....
Connect the server, please input the address(default = 12
7.0.0.1) and the port(default = 8080),
input "default" to connect as the default config
or input the connect address and port, dividng by a blank
space:
default
connect success
give yourself a nickname:
C
[NOTICE]C entered the chatting room!
[NOTICE]D entered the chatting room!
[NOTICE]E entered the chatting room!
A: hi

C:\Windows\System32\cmd.exe - java Client
Microsoft Windows [版本 10.0.22000.1335]
(c) Microsoft Corporation。保留所有权利。
D:\Course\2022_2023FW\Java\project\project2\Client\src>java Client
Connecting .....
Connect the server, please input the address(default = 127.0.0.1) and the port(default = 8080),
input "default" to connect as the default config
or input the connect address and port, dividng by a blank space:
default
connect success
give yourself a nickname:
D
[NOTICE]D entered the chatting room!
[NOTICE]E entered the chatting room!
A: hi

C:\Windows\System32\cmd.exe - java Client
Microsoft Windows [版本 10.0.22000.1335]
(c) Microsoft Corporation。保留所有权利。
D:\Course\2022_2023FW\Java\project\project2\Client\src>java Client
Connecting .....
Connect the server, please input the address(default = 127.0.0.1) and the port(default = 8080),
input "default" to connect as the default config
or input the connect address and port, dividng by a blank space:
default
connect success
give yourself a nickname:
E
[NOTICE]E entered the chatting room!
A: hi

- 进行对话

C:\Windows\System32\cmd.exe - java Client
(c) Microsoft Corporation。保留所有权利。
D:\Course\2022_2023FW\Java\project\project2\Client\src>java Client
Connecting .....
Connect the server, please input the address(default = 127.0.0.1) and the port(default = 8080),
input "default" to connect as the default config
or input the connect address and port, dividng by a blank space:
default
connect success
give yourself a nickname:
A
[NOTICE]A entered the chatting room!
[NOTICE]B entered the chatting room!
[NOTICE]C entered the chatting room!
[NOTICE]D entered the chatting room!
[NOTICE]E entered the chatting room!
hi
A: hi
B: hello
B: how are you
C: i am fine
C: thanku
A: it's OK
D: me too
E: same
D: and you?
B: i i am fine too
C: that's good
A: i am happy to hear that

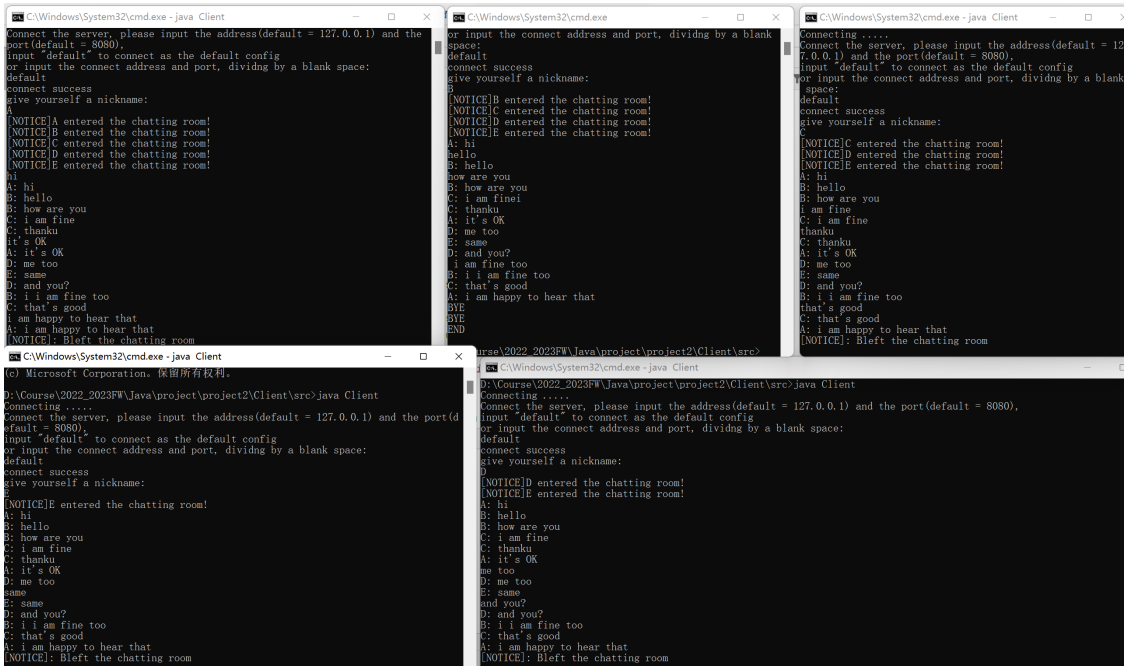
- 输入 BYE 客户端断开

C:\Windows\System32\cmd.exe

```
or input the connect address and port, dividng by a blank
space:
default
connect success
give yourself a nickname:
B
[NOTICE]B entered the chatting room!
[NOTICE]C entered the chatting room!
[NOTICE]D entered the chatting room!
[NOTICE]E entered the chatting room!
A: hi
hello
B: hello
how are you
B: how are you
C: i am finei
C: thanku
A: it's OK
D: me too
E: same
D: and you?
 i am fine too
B: i i am fine too
C: that's good
A: i am happy to hear that
BYE
BYE
END

D:\Course\2022_2023FW\Java\project\project2\Client\src>
```

- 此时其余的客户端收到消息：`B left the chatting room`



Chapter4 遇到的问题

在打包jar包时，运行时，报错：

```
D:\Course\2022_2023FW\Java\project\project2\server\out\artifacts\server_jar>java -jar .\server.jar
错误: 加载主类 Server 时出现 LinkageError
        java.lang.UnsupportedClassVersionError: Server has been compiled by a more recent version of the Java Runtime (c
lass file version 63.0), this version of the Java Runtime only recognizes class file versions up to 55.0
```

在网上查阅资料知，这是由于运行.jar的环境和打包.jar包的环境的java版本不一致导致。