

# 华东师范大学数据科学与工程学院实验报告

课程名称：计算机网络与编程

年级：2020 级

上机实践成绩：

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上机实践名称：Socket 编程优化

上机实践日期：2022/5/13

## 一、实验目的

实现单服务器多客户端通信  
对数据发送和接收进行优化

## 二、实验任务

实现单服务器和多客户端的 TCP Socket 通信  
将数据发送与执行并行

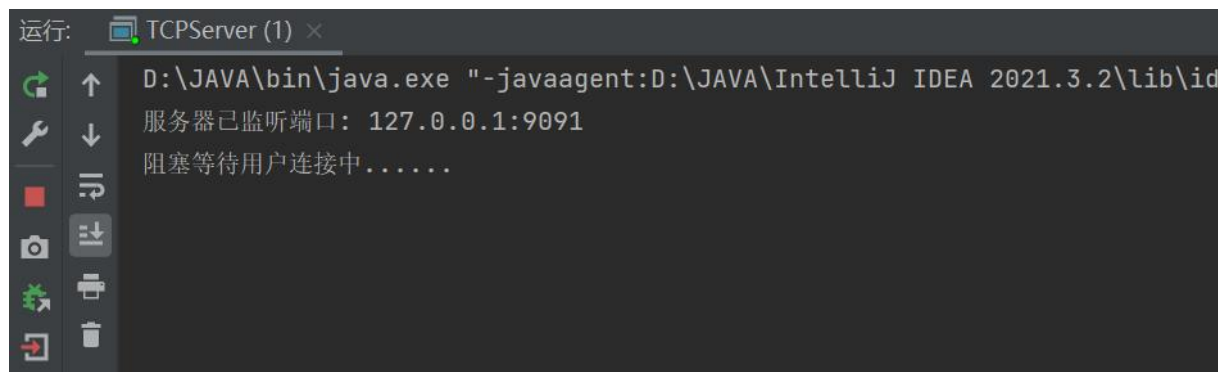
## 三、使用环境

IntelliJ IDEA 2020.3.2  
JDK 11.0.6

## 四、实验过程

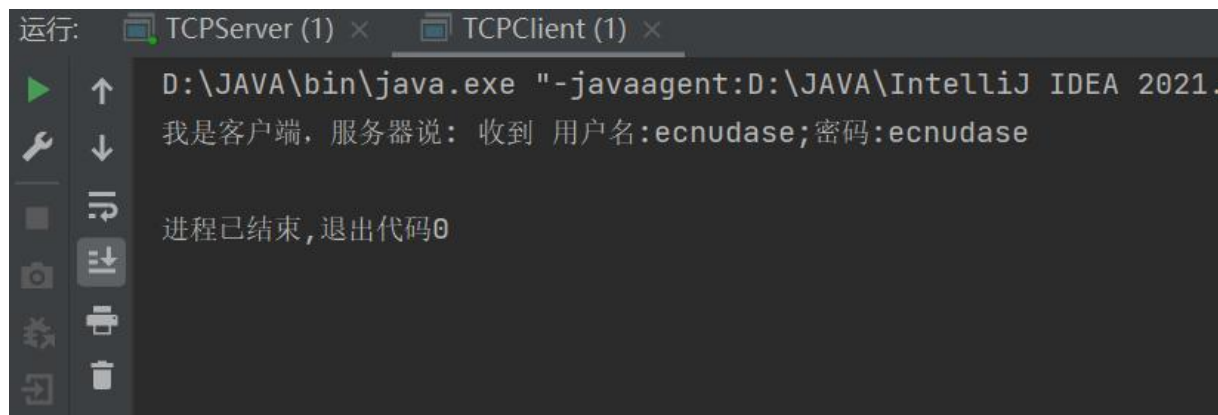
**Task1:** 分别启动一个 TCPServer 和多个 TCPClient，将运行结果附在实验报告中。

启动 TCPServer：



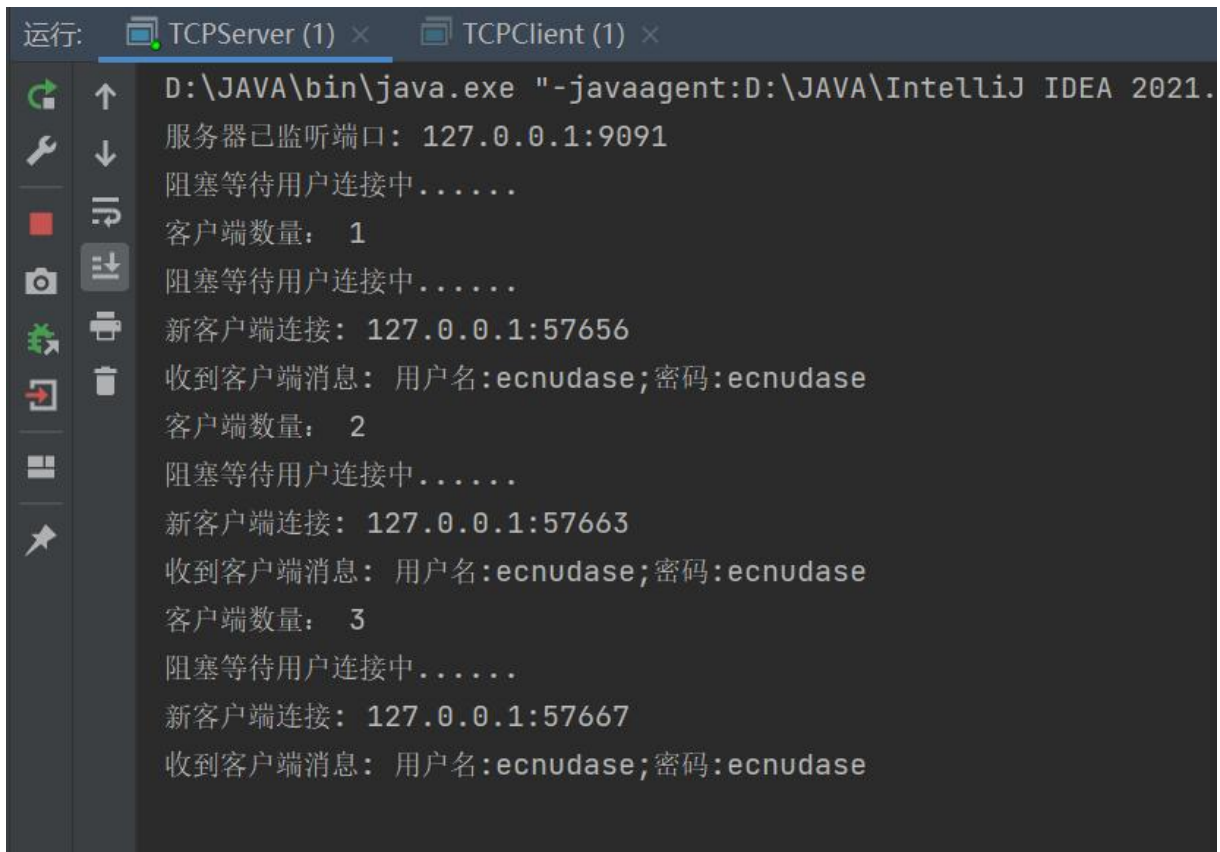
```
运行: TCPServer (1) ×
D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ IDEA 2021.3.2\lib\id
服务器已监听端口: 127.0.0.1:9091
阻塞等待用户连接中.....
```

启动三个 TCPClient：



```
运行: TCPServer (1) × TCPClient (1) ×
D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ IDEA 2021.
我是客户端, 服务器说: 收到 用户名:ecnudase;密码:ecnudase
进程已结束,退出代码0
```

运行结果:



```
运行: TCPClient (1) x TCPServer (1) x
D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ IDEA 2021.
服务器已监听端口: 127.0.0.1:9091
阻塞等待用户连接中.....
客户端数量: 1
阻塞等待用户连接中.....
新客户端连接: 127.0.0.1:57656
收到客户端消息: 用户名:ecnudase;密码:ecnudase
客户端数量: 2
阻塞等待用户连接中.....
新客户端连接: 127.0.0.1:57663
收到客户端消息: 用户名:ecnudase;密码:ecnudase
客户端数量: 3
阻塞等待用户连接中.....
新客户端连接: 127.0.0.1:57667
收到客户端消息: 用户名:ecnudase;密码:ecnudase
```

**Task2:** 修改 Client 类, 使其发送和接收并行, 即当和服务器端连接时, 可随时发送和接收信息, 将修改后的 Client 代码附在实验报告中。

修改后的 Client 代码:

```
package Socket_optimization;
import java.io.*;
import java.net.InetAddress;
import java.net.InetSocketAddress;
import java.net.Socket;
import java.util.Scanner;

public class TCPClient {
    private static final int PORT = 9091;

    public static void main(String []args) throws IOException{
        Socket socket = new Socket();
        //连接本地9091端口, timeout为3000ms
        socket.connect(new InetSocketAddress(InetAddress.getLocalHost(),PORT), timeout: 3000);
        System.out.println("客户端为:"+socket.getLocalAddress()+":"+socket.getLocalPort());
        System.out.println("服务器为:"+socket.getInetAddress()+":"+socket.getLocalPort());
        ClientHandler serverHandler=new ClientHandler (socket);
        serverHandler.start();
        Scanner sc= new Scanner(System.in);
        while(sc.hasNext()){
            String s =sc.nextLine();
            serverHandler.send(s);
        }
        socket.close();
    }
}
```

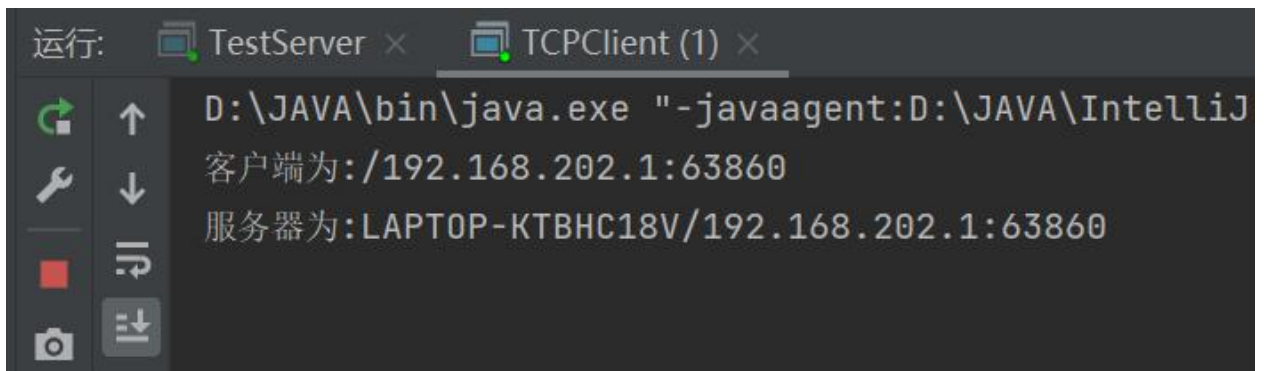
运行结果：

1) 运行 TestServer:

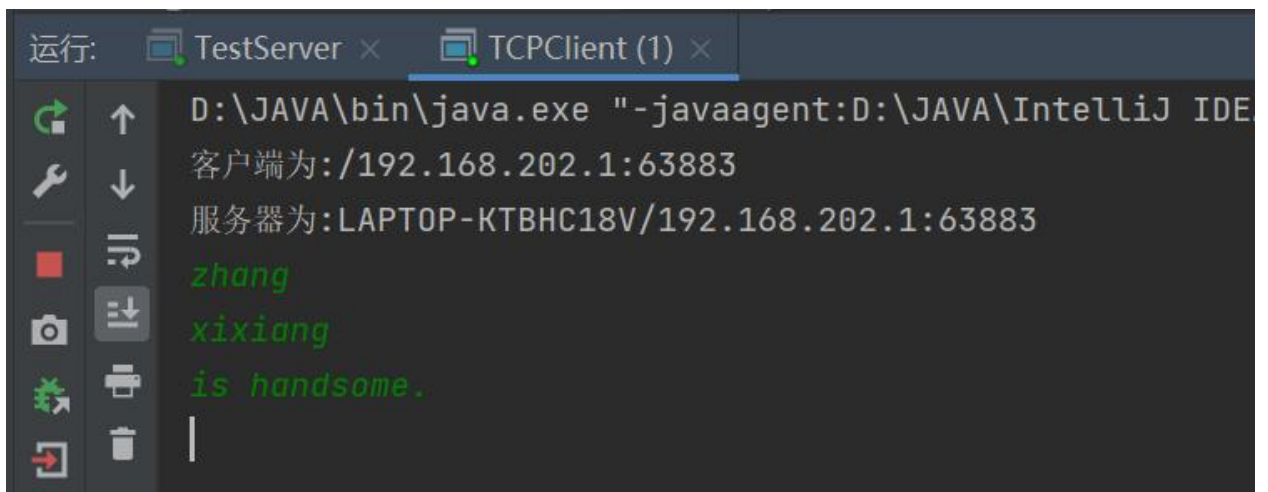


The screenshot shows an IDE window with two tabs: 'TestServer' and 'TCPClient (1)'. The 'TestServer' tab is active, displaying the command `D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ` and the output `阻塞等待新客户端连接中...` (Blocked waiting for new client connection...). The IDE interface includes standard icons for running, debugging, and other actions.

2) 运行 TCPClient, 并多次输入:

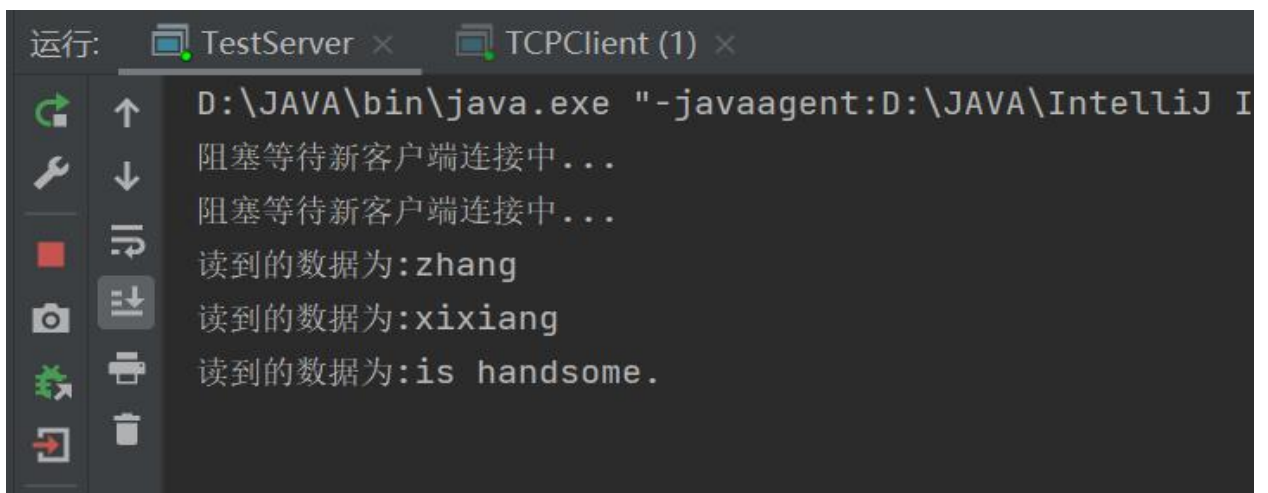


The screenshot shows the IDE window with 'TestServer' and 'TCPClient (1)' tabs. The 'TCPClient (1)' tab is active, displaying the command `D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ` and the output `客户端为:/192.168.202.1:63860` (Client is /192.168.202.1:63860) and `服务器为:LAPTOP-KTBHC18V/192.168.202.1:63860` (Server is LAPTOP-KTBHC18V/192.168.202.1:63860). The IDE interface includes standard icons for running, debugging, and other actions.



The screenshot shows the IDE window with 'TestServer' and 'TCPClient (1)' tabs. The 'TCPClient (1)' tab is active, displaying the command `D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ IDE` and the output `客户端为:/192.168.202.1:63883` (Client is /192.168.202.1:63883) and `服务器为:LAPTOP-KTBHC18V/192.168.202.1:63883` (Server is LAPTOP-KTBHC18V/192.168.202.1:63883). The output also shows the received data: `zhang`, `xixiang`, and `is handsome.` The IDE interface includes standard icons for running, debugging, and other actions.

3) TestServer 输出读到数据: (即当和服务器端连接时, 可随时发送和接收信息)



The screenshot shows the IDE window with 'TestServer' and 'TCPClient (1)' tabs. The 'TestServer' tab is active, displaying the command `D:\JAVA\bin\java.exe "-javaagent:D:\JAVA\IntelliJ I` and the output `阻塞等待新客户端连接中...` (Blocked waiting for new client connection...). The output also shows the received data: `读到的数据为:zhang` (Received data is: zhang), `读到的数据为:xixiang` (Received data is: xixiang), and `读到的数据为:is handsome.` (Received data is: is handsome.). The IDE interface includes standard icons for running, debugging, and other actions.

## 五、总结

通过本次实验实现了单服务器和多客户端的 TCP Socket 通信,并且对数据发送进行了优化,将数据发送与执行并行。进一步巩固了 Socket 编程。