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Programming Assignment 1

Code Compilation and Running:

Code was compiled with “javac Server.java” and “javac Client.java”. This gave us “Server.class” and “Client.class”. To run the code, use two separate command lines, one using “java Server <port>”, the other “java Client <Ip> <Port>”.

Code Structure:

- For the server, it starts by checking if only one parameter is passed in which should be the port number. Then check if what was passed in is an integer and then if it is, check if it lies within the port range of 0-65536. Then it tries to open the port, if it is being used then an exception will be thrown. If the port is opened, then it waits for a client to connect. When a client connects, it sends an initial message and then looks for an input from the client. Once it receives a command, it sends back a joke if a valid joke is requested, closes the sockets and ends the program if the client sends “bye”. Once a

valid joke is requested, the server will read the joke from the “jokes” folder and continuously reads and sends the lines from the txt file to the output socket until it runs out of lines and then finally sends “END” to tell the client to stop expecting input from the server. The server then prints a confirmation and loops back until the user says “bye”.

- For the client, it first checks if there are only 2 args for the IP and port number the client is trying to connect to. Then it goes through the same process as the server to see if the port number is valid. Then it tries to open a socket. If the host or IP could not be reached it will tell the user it could not find the host name. If there was an issue with the port, it will say that it could not connect to the host and port, then inform the user the port may not be opened. It then expects an initial message from the server. Then the user is prompted to select a joke and when it does it will send out a command to the server. If the user types “bye”, the client will send out the bye command to the server and then close the socket then exit the program. If something invalid is typed, then it will just ask for another input until something valid is entered. If it makes it past this loop, then the client will expect a joke and will write out a file line by line in the client directory until it gets the “END”.

Code Outputs:

```
Command Prompt - java Sen
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Server.java
C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Server is listening on port: 4663
Client connected.
Command received: Joke 1
Request for Joke 1 received.
Successfully sent the joke
Command received: Joke 2
Request for Joke 2 received.
Successfully sent the joke
Command received: Joke 3
Request for Joke 3 received.
Successfully sent the joke
Command received: bye
Successfully closed sockets.

C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Server is listening on port: 4663
Client connected.

src
Tim Z > IdeaProjects > PA1 > src >
Search src
New
Desktop
Downloads
Documents
Pictures
Music
Videos
Internship
USB
5 Items
Name
Jokes
Client.class
Client.java
Server.class
Server.java
Date modified
2/27/2024 1:03 AM
2/27/2024 11:32 PM
2/28/2024 12:56 AM
2/27/2024 11:32 PM
2/28/2024 12:38 AM
Type
File folder
CLASS File
IntelliJ IDEA
CLASS File
IntelliJ IDEA
Size
4 KB
5 KB
4 KB
5 KB
```

```
Command Prompt - java Cle
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Client.java
C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
Joke 1
Successfully received: Joke 1.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
Joke 2
Successfully received: Joke 2.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
Joke %
Invalid Option!
Joke 3
Successfully received: Joke 3.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
fjdsalfo
Invalid Option!
fdjliao
Invalid Option!
fdnliao
Invalid Option!
bye
Disconnecting
Successfully closed socket.

C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
```

Here the client successfully connects to the server.

```
Command Prompt - java Sen
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Server.java
C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Server is listening on port: 4663
Client connected.
Command received: Joke 1
Request for Joke 1 received.
Successfully sent the joke
Command received: Joke 2
Request for Joke 2 received.
Successfully sent the joke
Command received: Joke 3
Request for Joke 3 received.
Successfully sent the joke
Command received: bye
Successfully closed sockets.

C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Server is listening on port: 4663
Client connected.
Command received: Joke 1
Request for Joke 1 received.
Successfully sent the joke

src
Tim Z > IdeaProjects > PA1 > src >
Search src
New
Desktop
Downloads
Documents
Pictures
Music
Videos
6 Items
Name
Jokes
Client.class
Client.java
Server.class
Server.java
Joke.txt
Date modified
2/27/2024 1:03 AM
2/27/2024 11:32 PM
2/28/2024 12:56 AM
2/27/2024 11:32 PM
2/28/2024 12:38 AM
2/28/2024 1:04 AM
Type
File folder
CLASS File
IntelliJ IDEA
CLASS File
IntelliJ IDEA
Text Document
Size
4 KB
5 KB
4 KB
5 KB
1 KB
```

```
Command Prompt - java Cle
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Client.java
C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
Joke 1
Successfully received: Joke 1.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
```

Here the client sends a request and the server sends back the joke

```

C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
Joke 1
Successfully received: Joke 1.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
fhdaisu
Invalid Option!
Joke 543
Invalid Option!

```

Here the client user tries to send in an invalid option.

The screenshot displays a Windows file explorer window showing the contents of the 'src' directory. The files listed are:

Name	Date modified	Type	Size
Client.java	2/28/2024 12:56 AM	IntelliJ IDEA	5 KB
Server.class	2/27/2024 11:32 PM	CLASS File	4 KB
Server.java	2/28/2024 12:38 AM	IntelliJ IDEA	5 KB
Joke 1.txt	2/28/2024 1:04 AM	Text Document	1 KB
Joke 2.txt	2/28/2024 1:04 AM	Text Document	1 KB
Joke 3.txt	2/28/2024 1:06 AM	Text Document	1 KB

Below the file explorer, a command prompt window shows the execution of the Java client and server programs. The client sends requests for jokes, and the server responds with the joke text or an invalid option message.

```

C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
Joke 1
Successfully received: Joke 1.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
fhdaisu
Invalid Option!
Joke 543
Invalid Option!

```

Here the client requests the rest of the jokes.

```
Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Server.java
C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Port opened at port: 4663
Client connected.
Command received: Joke 1
Request for Joke 1 received.
Successfully sent the joke
Command received: Joke 2
Request for Joke 2 received.
Successfully sent the joke
Command received: Joke 3
Request for Joke 3 received.
Successfully sent the joke
Command received: bye
Successfully closed sockets.

C:\Users\drago\IdeaProjects\PA1\src>java Server 153
Port opened at port: 153
Client connected.
Command received: bye
Successfully closed sockets.

C:\Users\drago\IdeaProjects\PA1\src>netstat -abn
The requested operation requires elevation.

C:\Users\drago\IdeaProjects\PA1\src>java Server 5426
Port is already in use

C:\Users\drago\IdeaProjects\PA1\src>

Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Client.java
C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
fda
Invalid Option!
Joke 1

Administrator: Command Prompt
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\System32>C:\Users\drago>netstat -abn
'c:\Users\drago' is not recognized as an internal or external command,
operable program or batch file.

C:\Windows\System32>The requested operation requires elevation.
'The' is not recognized as an internal or external command,
operable program or batch file.

C:\Windows\System32>netstat -abn

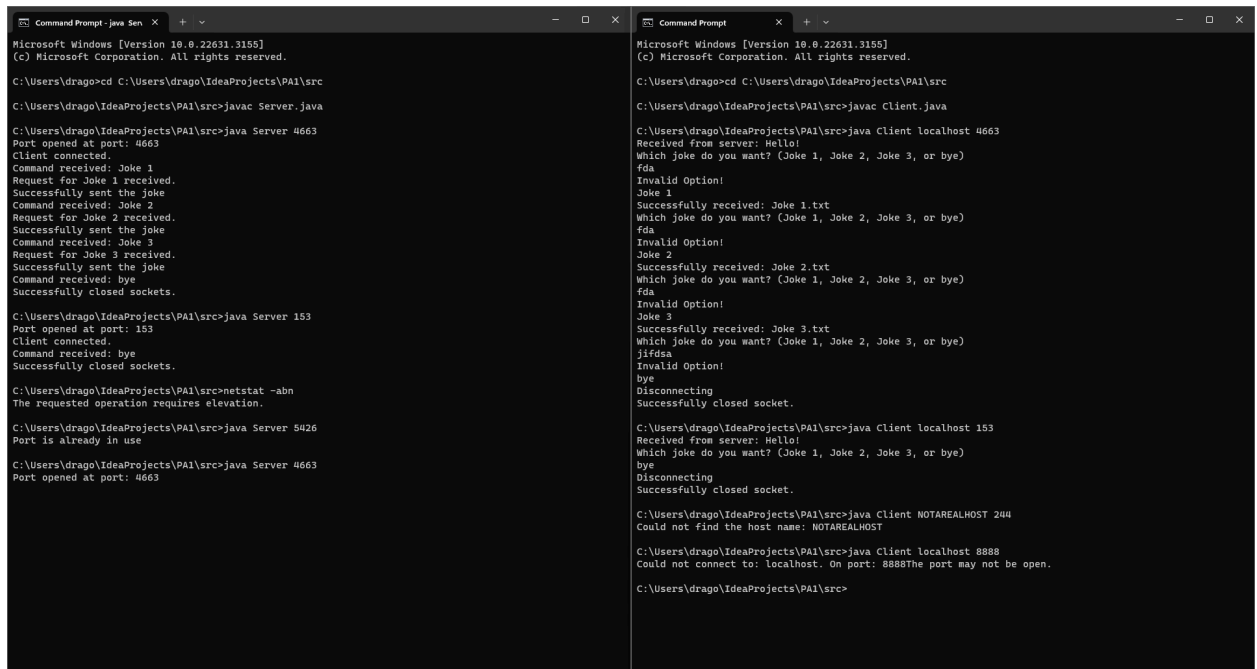
Active Connections
Proto Local Address Foreign Address State
TCP 0.0.0.0:135 0.0.0.0:0 LISTENING
RpsSs
[svchost.exe]
TCP 0.0.0.0:445 0.0.0.0:0 LISTENING
Can not obtain ownership information
TCP 0.0.0.0:5040 0.0.0.0:0 LISTENING
CDPSvc
[svchost.exe]
TCP 0.0.0.0:5426 0.0.0.0:0 LISTENING
Can not obtain ownership information
TCP 0.0.0.0:7680 0.0.0.0:0 LISTENING
Can not obtain ownership information
TCP 0.0.0.0:27036 0.0.0.0:0 LISTENING
[steam.exe]
```

Here the server tries to start on a port in use.

```
C:\Users\drago\IdeaProjects\PA1\src>java Client NOTAREALHOST 244
Could not find the host name: NOTAREALHOST

C:\Users\drago\IdeaProjects\PA1\src>
```

Here the client tries connecting to a non-existent host.



```
Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Server.java

C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Port opened at port: 4663
Client connected.
Command received: Joke 1
Request for Joke 1 received.
Successfully sent the joke
Command received: Joke 2
Request for Joke 2 received.
Successfully sent the joke
Command received: Joke 3
Request for Joke 3 received.
Successfully sent the joke
Command received: bye
Successfully closed sockets.

C:\Users\drago\IdeaProjects\PA1\src>java Server 153
Port opened at port: 153
Client connected.
Command received: bye
Successfully closed sockets.

C:\Users\drago\IdeaProjects\PA1\src>netstat -abn
The requested operation requires elevation.

C:\Users\drago\IdeaProjects\PA1\src>java Server 5426
Port is already in use

C:\Users\drago\IdeaProjects\PA1\src>java Server 4663
Port opened at port: 4663

Microsoft Windows [Version 10.0.22631.3155]
(c) Microsoft Corporation. All rights reserved.

C:\Users\drago>cd C:\Users\drago\IdeaProjects\PA1\src
C:\Users\drago\IdeaProjects\PA1\src>javac Client.java

C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 4663
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
fda
Invalid Option!
Joke 1
Successfully received: Joke 1.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
fda
Invalid Option!
Joke 2
Successfully received: Joke 2.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
jifda
Invalid Option!
Joke 3
Successfully received: Joke 3.txt
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
bye
Disconnecting
Successfully closed socket.

C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 153
Received from server: Hello!
Which joke do you want? (Joke 1, Joke 2, Joke 3, or bye)
bye
Disconnecting
Successfully closed socket.

C:\Users\drago\IdeaProjects\PA1\src>java Client NOTAREALHOST 244
Could not find the host name: NOTAREALHOST

C:\Users\drago\IdeaProjects\PA1\src>java Client localhost 8888
Could not connect to: localhost. On port: 8888The port may not be open.

C:\Users\drago\IdeaProjects\PA1\src>
```

Here the host exists, but the client could not connect through the port.

Lesson Learned:

The basic things learned from this assignment were opening a socket on a server and client. We also learned how to send data over this connection which includes the different streams, and ways to classes that help facilitate the transfer. Something cool that we were able to accomplish was connect a client to a server over the internet. We just had to port forward the server host on the port we planned to run on. Then the client would just need to connect to the server's public IP. It also required a refresher on how to read a file and then figuring out how to transmit the bytes to the client.