Frankfurt University Of Applied Sciences

– Fachbereich Informatik –

Chat Application in Two-Layers-Architectur

Object-Oriented-Programming Java Advance

Bachelor of Science (B.Sc.)

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LOCATION:
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TIME FRAME:
14. Juli 2022

DECLARATION

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Frankfurt am Main, 14. Juli 2022

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We have seen that computer programming is an art,
because it applies accumulated knowledge to the world,
because it requires skill and ingenuity, and especially
because it produces objects of beauty.

— Donald E. Knuth [Knu74]

ACKNOWLEDGMENTS

Put your acknowledgments here.

Many thanks to everybody who already sent me a postcard!

Regarding the typography and other help, many thanks go to Marco Kuhlmann, Philipp Lehman, Lothar Schlesier, Jim Young, Lorenzo Pantieri and Enrico Gregorio[1], Jörg Sommer, Joachim Köstler, Daniel Gottschlag, Denis Aydin, Paride Legovini, Steffen Prochnow, Nicolas Repp, Hinrich Harms, Roland Winkler, Jörg Weber, Henri Menke, Claus Lahiri, Clemens Niederberger, Stefano Bragaglia, Jörn Hees, Scott Lowe, Dave Howcroft, and the whole LaTeX-community for support, ideas and some great software.

Regarding LyX: The LyX port was intially done by *Nicholas Mariette* in March 2009 and continued by *Ivo Pletikosić* in 2011. Thank you very much for your work and for the contributions to the original style.

1 Members of GuIT (Gruppo Italiano Utilizzatori di TeX e LaTeX)

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INTRODUCTION

1 THEORY

1.1 JAVA

Java is one of the most popular programming language.It is develop by Oracle Corporation in May 23, 1995. It is also used to develop mobile apps, web apps, desktop apps, games and much more. It has helped to reduce costs, shortens development timeframes, drive innovation, and improve application services.

There are five primary goals in the creation of the Java language.

- It must be simple, object-oriented, and familiar.
- It must be robust and secure.
- It must be architecture-neutral and portable.
- It must be interpreted, threaded and dynamic.

1.2 THREAD

A thread of execution is the smallest sequence of programmed instructions that can be managed independently by a scheduler, which is typically a part of the operating system. The implementation of threads and processes differs between operating systems,but in most cases a thread is a component of a process. The multiple threads of a given process may be executed concurrently *viamultithreadingcapabilities*, sharing resources such as memory, while different processes do not share these resources.

A thread is a thread of execution in a program. The Java Virtual Machine allows an application to have multiple threads of execution running concurrently. Every thread has a priority. Threads with higher priority are executed in preference to threads with lower priority.

1.3 GIT

Git is an open source distributed version control system, mainly used for source code management, with an emphasis on speed. Git was initially designed and created by Linus Torvalds for Linux kernel development. Git operates on a decentralized architecture, so every Git working directory is a full-fledged repository with a complete history and full revision-tracking capabilities, and is not dependent upon network access or a central server. Unlike popular non-distributed predecessors, such as Subversion and CVS, Git only needs a central server for one thing: publishing changes to users of

that server. You can equally share changes directly with other people without the need to consult a central hub.

1.4 GITLAB

GitLab Inc. is an open-core company that provides GitLab, a DevOps software package that combines the ability to develop,secure, and operate software in a single application. The open source software project was created by Ukrainian developer Dmitriy Zaporozhets and Dutch developer Sytse Sijbrandij. Since its founding, GitLab Inc. has been centered around remote work. GitLab has an estimated 30 million registered users, with 1 million being active licensed users.

1.5 PROJECT

A project is well-defined task, which is a collection of several operations done in order to achieve a goal $for example, software development and delivery$. A Project can be characterized as:

- Every project may has a unique and distinct goal.
- Project is not routine activity or day-to-day operations.
- Project comes with a start time and end time.
- Project ends when its goal is achieved hence it is a temporary phase in the lifetime of an organization.
- Project needs adequate resources in terms of time, manpower, finance, material and knowledge-bank.

A software Project is the complete procedure of software development from requirement gathering to testing and maintenance, carried out according to the execution methodologies, in a specified period of time to achieve intended software product.

1.6 OUR SOFTWARE PROJECT

In our project, we have developed an application where two or more users can interact and exchange messages of different file types such as text, image, video, PDF, and so on. Mainly there are two GUI windows which make the communication user friendly and easy to communicate. first window is the server and the other is the client. The server window has the main privilege of starting and stopping the application. When the server is started, the clients can exchange messages. The client sends a message to the server and the message is forwarded by the server to the target user. The recipient client can receive the message. If necessary, admin can delete the clients or the group by selecting.

On the Client window, user can send messages to different users and groups. First of all, user needs to select user or group he/she want to chat with other user or group, user will be able to send text to the other user and group in the prototype version of our application.There is small text area where user will be able to write in it and if they want to attach other document with it,can add with add File button and forward it to other with send button. User can navigate other users and group using the search. User can also select new contacts and create new group with users. On the config tab, the ip address, port number and name of server and client can be seen and can be saved if save button is clicked.

Our team divided the development of this application into different versions, with each new version our team will add more functionality, features, try to fix bugs and provide user friendly experience to the users.In the version 1.0, users can simply chat with other user and groups. In the version 2.0, users will be able to send images,text files,pdf files etc. In the version 3.0, user can send videos and play it on message window. Later, our team will come with more ideas and work with user's suggestions to improve our application.

2 IMPLEMENTATION

2.1 PROBLEM

Forward the message to the specified client. With the help of java suckt it is possible to establish a connection between the server and a client. Through this connection the client and the server can communicate with each other. The client can send a message to the server, and the server can also reply to the client and send retransmissions.

The difficulty is that the client sends the messages to the other client. In this case, the message must be sent from the first client to the server, and then the messages must be forwarded from the server to the correct client. After that, the other client must send the response back to the first client via the server.

2.2 SOLUTION

After a lot of thinking, a solution was found that uses the Thread class. The Thread class has to be implemented for the client, so that the client asks the asks the server if there are new messages for the client, if there are new messages they are sent one by one from the server to the client. This process is performed by the thread every second.

2.3 SERVER GUI

In the server mask you can enter a server with its IP address and port $Asdefault127.0.0.1 : 8080$ and then click the Start server button to start the server. When the server is started, two tables will display all connected clients and all created groups, respectively. If you click on the Client tab, a table with the following columns will be displayed (checked, username, host, port).

The column with the check boxes are used to select the clients to be deleted. After the clients are selected, you should click the "Delete" button under the table.
The "Groups" table has less columns than the "Clients" table, namely (Check, Name of the group, count of clients). The "Check" column has the same principle of operation as in the "Clients " table, the groups can be selected to be deleted.
when a client is deleted, a message is sent to all other clients with the content (the client is deleted with server). This message $theGroupisdeletedwithserve$ is also sent for all clients when a group is deleted.

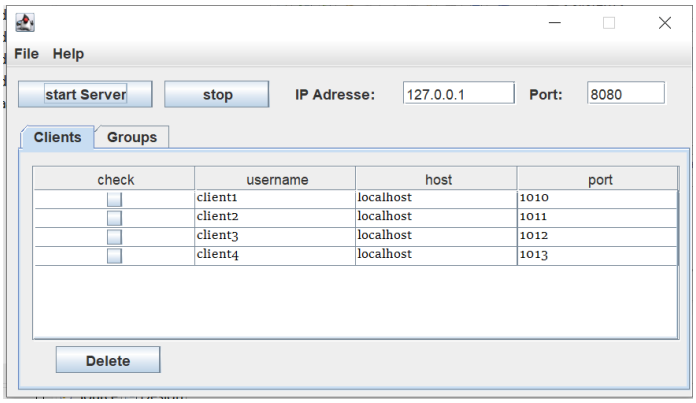

Figure 2.1: GUI-Server-Clients

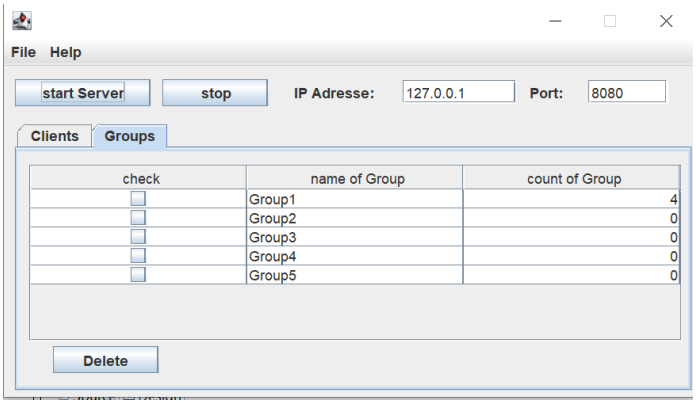

Figure 2.2: GUI-Server-Groups

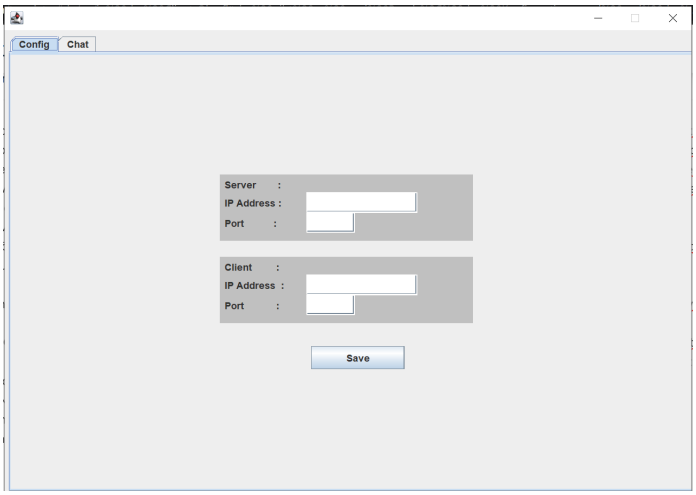

Figure 2.3: Configuration of Client

If you want to stop the server, it must click on the "Stop" button at the top of the mask. when you want to close the server application, click on File –>Exit.

2.4 CLIENT GUI

There are two panels in the client interface, namely the configuration panel and the chat panel. In the configuration panel you have to enter the ip address and port of the server but as default values they are entered as follows (IP-address :127.0.0.1 , port : 8080) After that the IP-address and port of client is detected.

The username is set as default by "Client" and "Port" *ExampleUsername* : *Client*65001. After that you have to click on the Save button to start the client. After adding the server and the client the configuration Panel will be displayed and chat Panal will be enabled. In the chat you can select contacts or groups so that the user can communicate with them. The user can also create and join or left a group by himself. If you want to see all clients and Groups , click the Search button The chat panel shows all clients with that the user has written. The messages between the clients are displayed and where the client can write. The chat also has a button to send different files like video, image and audio.

2.5 GROUP

When you click Create Group, a group is created on the server and displayed in a list where you can see all the created groups and clients. In this list you can search for the group you are looking for and find it quickly. The client that created the group will be the first member added to the group. Any client can create a group and then all other clients can join this group, by clicking on the selected group. When a client writes to the group or sends a

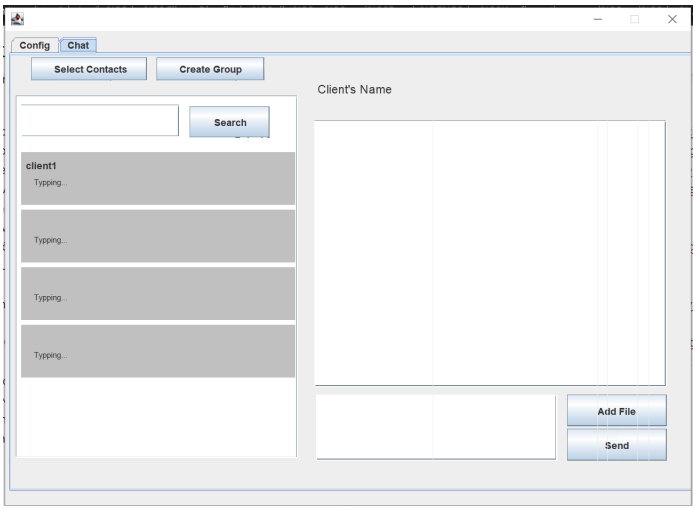

Figure 2.4: Chat of Client

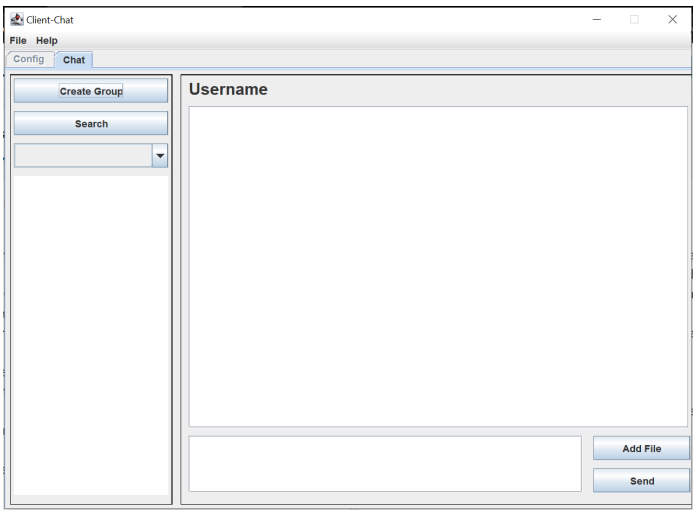

Figure 2.5: Gruppe

file, all other clients see this file. Any client can also leave the group at any time

3

IMPROVEMENT

BIBLIOGRAPHY

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