INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Peer-to-peer Real-time Multi User Chat System Project Report

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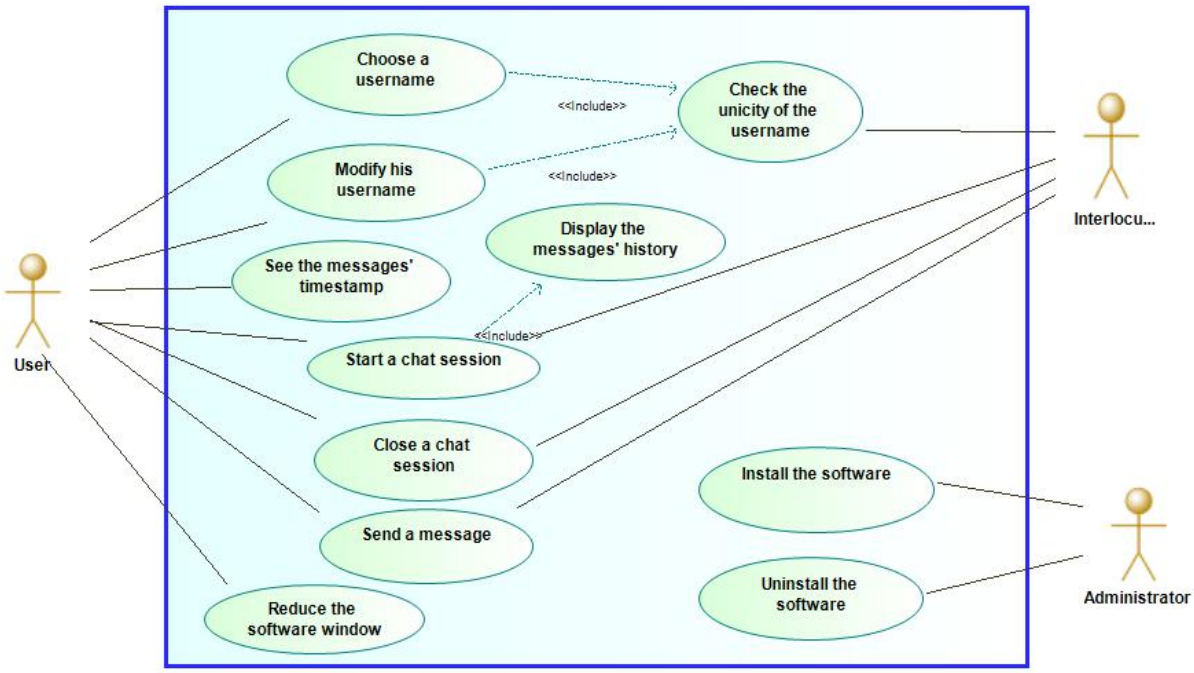
I. Introduction

This report documents our work on the Peer-to-peer Real-time Multi User Chat System Project. It contains initial UML Diagrams we make to design the software, our system architecture and technical choices and a guide to install and use the ChatSystem.

II. Design diagrams

1. Use Case Diagram

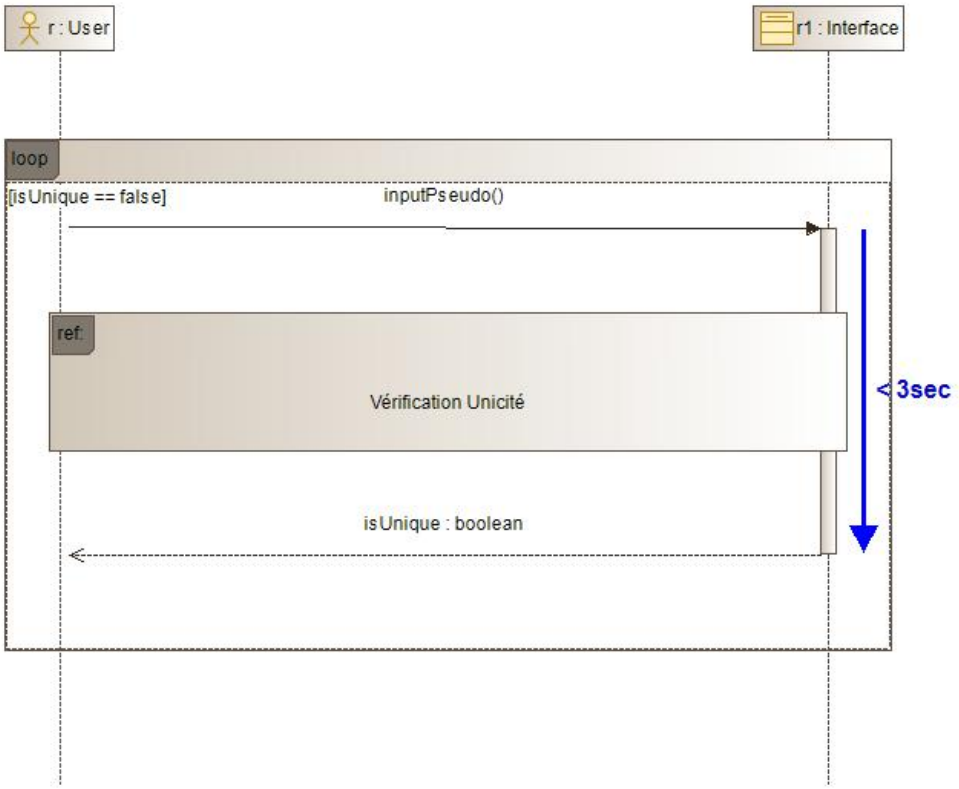
This diagram represents all the functionalities of our project.



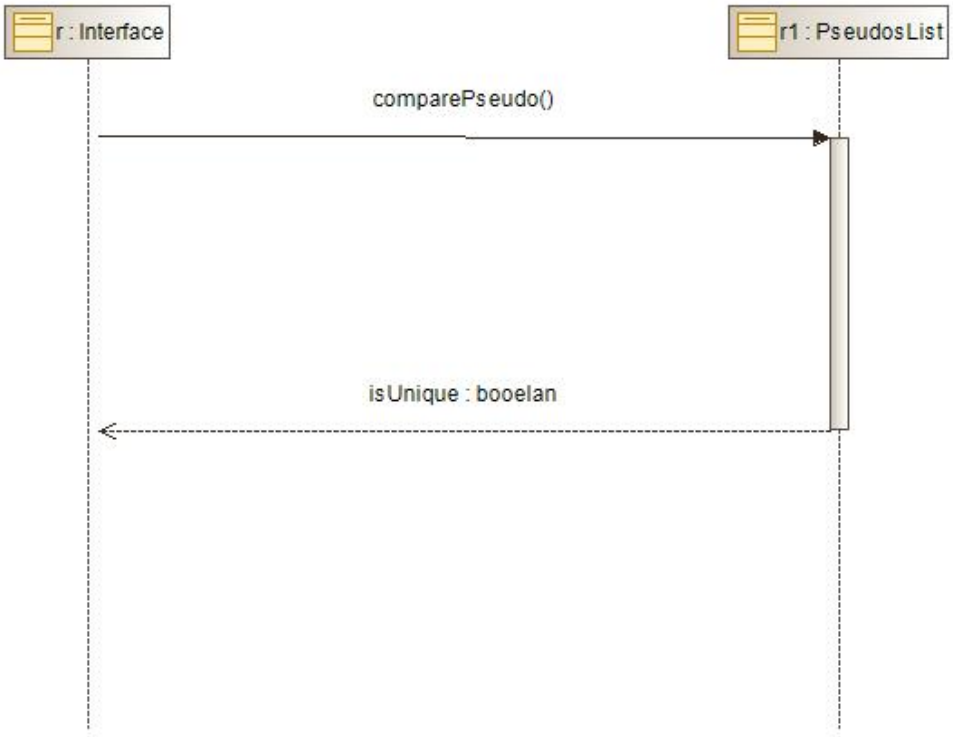
2. Sequence Diagrams

These are the first version of our sequence diagrams. They are not very representative of the final software because we had to modify a lot of things in order to provide a better quality product.

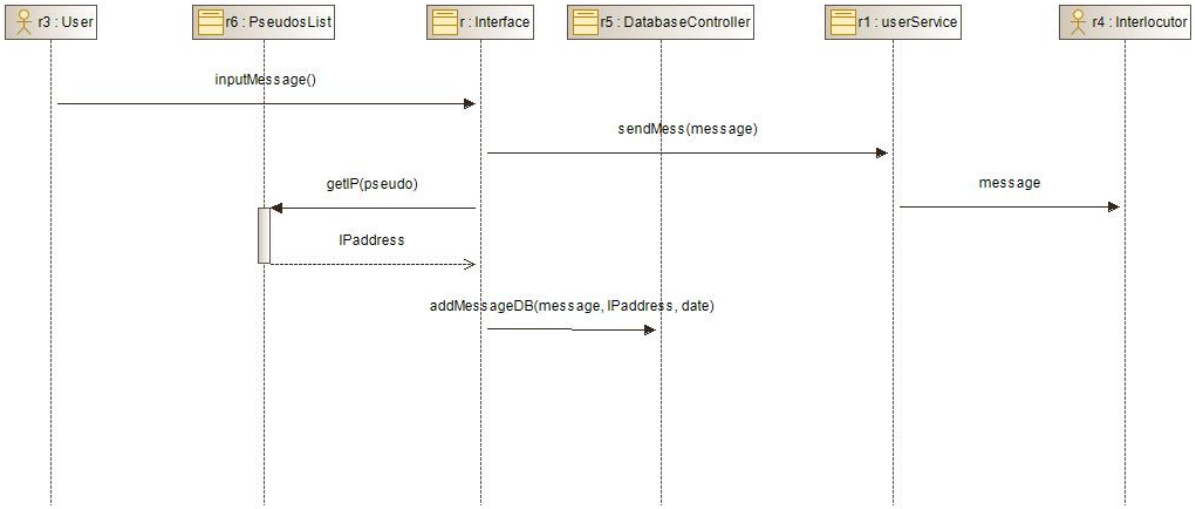
a) Choose a username



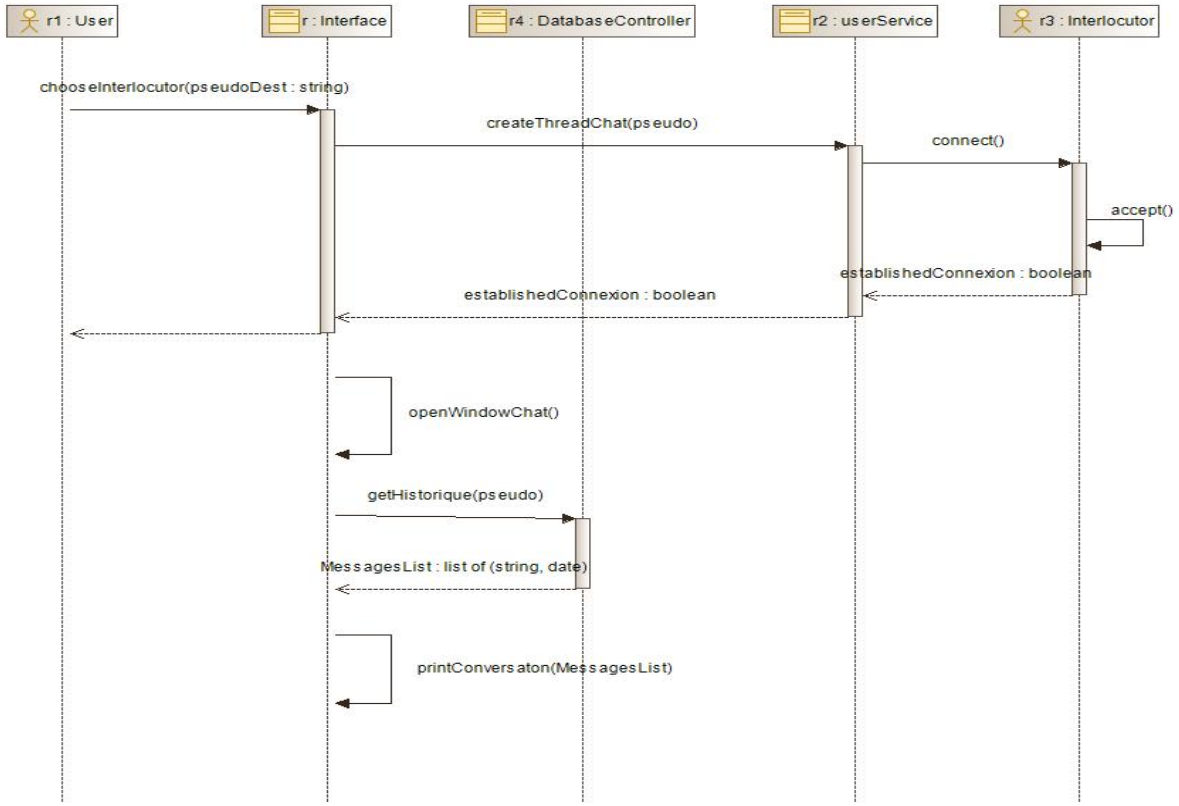
b) Check the unicity of the username



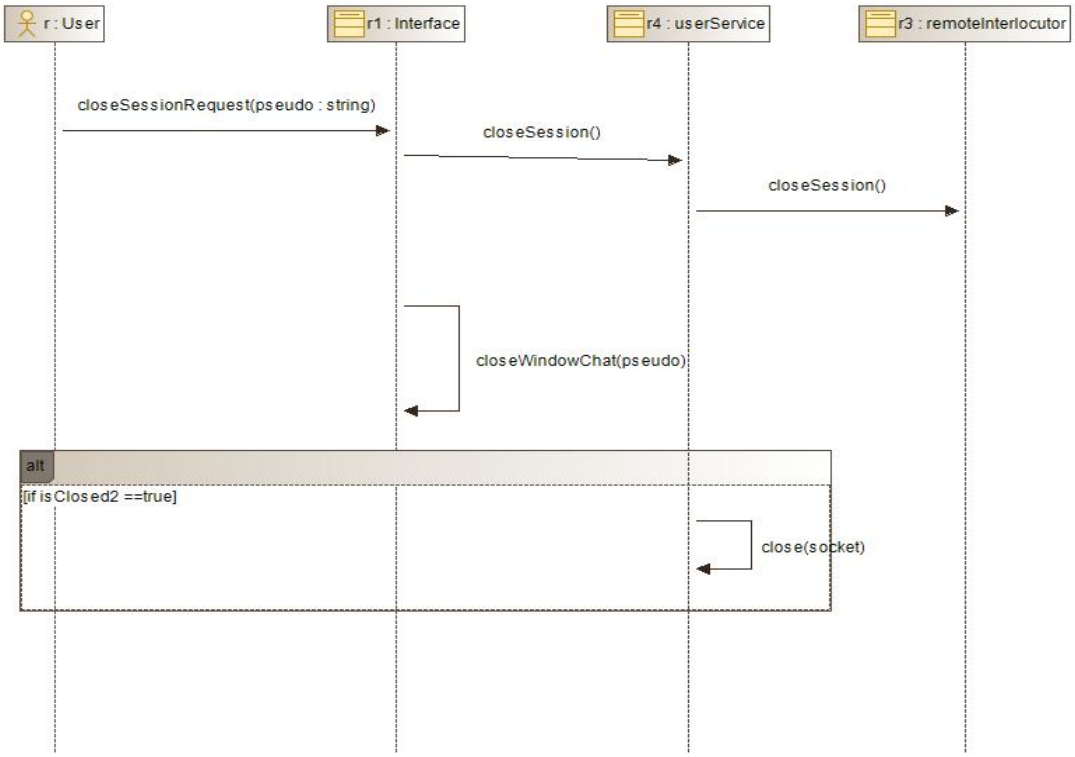
c) Send a message



d) Start a chat session

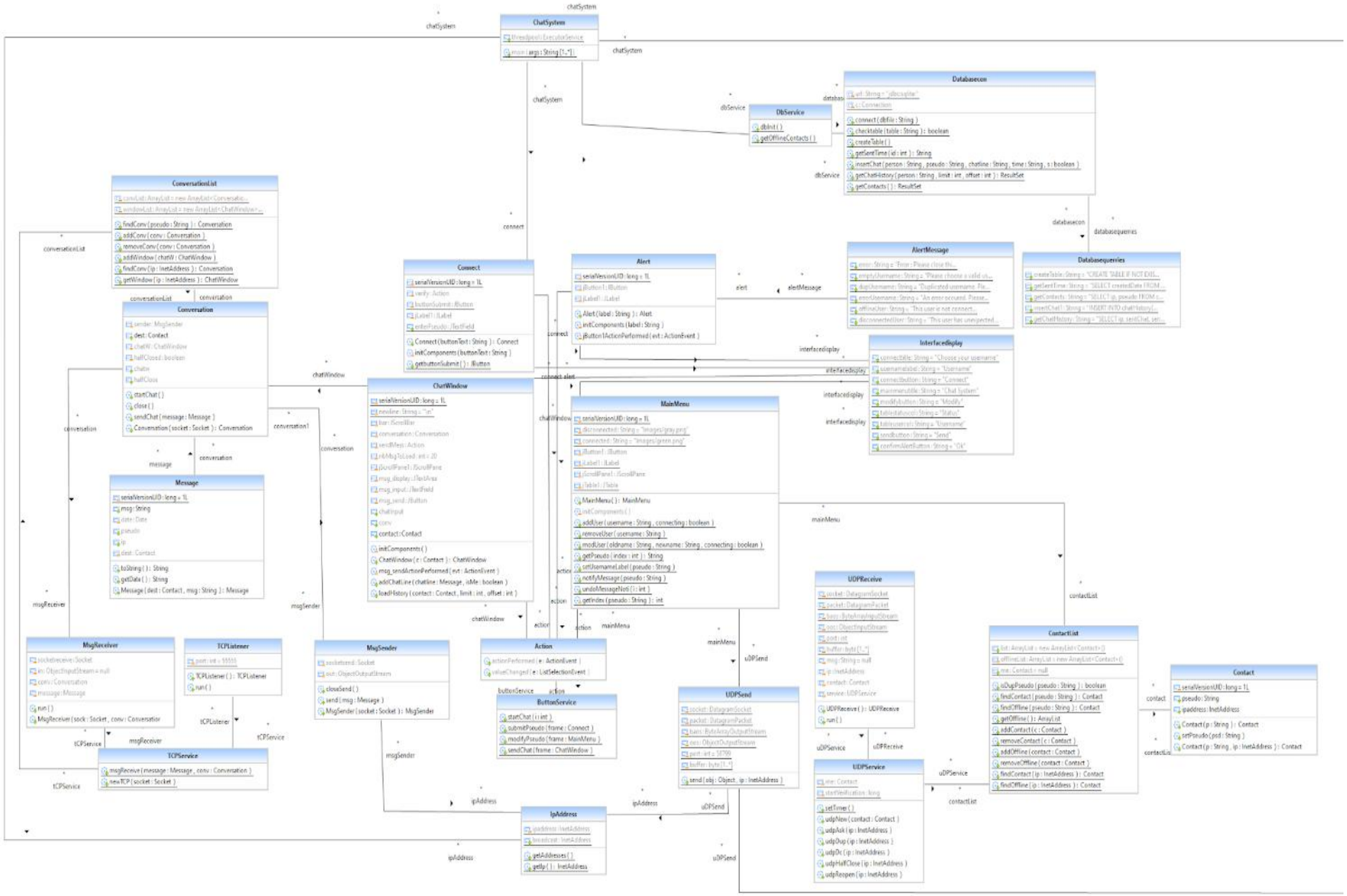


e) Close a chat session



3. Class Diagram

This is the final product Class Diagram.


ChatSystem
ConversationList
Conversation
Message
Connect
Alert
AlertMessage
Databasecon
DbService
Databasequeries
ChatWindow
MainMenu
InterfaceDisplay
MsgReceiver
TCPListener
TCPService
MsgSender
Action
ButtonService
IpAddress
UDPSend
UDPReceive
UDPService
ContactList
Contact

III. System architecture and technical choices

To make our project, we used 5 packages : ***chatsystem***, ***entities, userinterface***, ***database***, ***network***, ***service*** **and** ***ressources***.

The package ***chatsystem*** contains our main class ChatSystem.java which is used to deploy the program.

The package ***entities*** contains all the class that makes the data structure. The class ContactList is used to manage all instances of the Contact class which represent a person/machine on the chat system. Each contact is identified by the ip address of its' machine. The class ConversationList manage all instances of the Conversation class which is essentially a TCP connection with another machine on the system.

The package ***userinterface*** contains all the software interfaces with which the user interacts. We have the software's main window MainMenu.java, the chat window ChatWindow.java for every conversation the user has, the connecting window Connect.java for choosing a username when starting the program and when the user wants to modify his username. We used the library Java SWING for these classes.

The package ***database*** contains a class Databasecon.java. It represents our SQLite database connection (we used sqlite-jdbc). We made a decentralised database. The database is the file ChatSystemHistory.db and it contains all the messages the user has sent or received. Every message is identified its own id and also contains the ip address of the other machine.

The package ***network*** contains the java classes to send and receive UDP datagrams and to send, receive messages and connect to another machine via TCP

The package ***service*** is the core of our chat system which help the program react to each and every event (user interaction, sending, receiving message via TCP connection, interaction with other machine via UDP packet), all at the same time through multi-thread management.

The package ***ressources*** contains all the Strings used in our program that may be changed (switch language for the interface, database query development, …).

IV. How to install and deploy the ChatSystem

To install the ChatSystem, you need to have Maven and Java . We used Maven 3.8.4 and JDK 11 and 14.

You can download the project on this github link : https://github.com/tranxuanhaiminh/ChatSystem with the option *Download ZIP* or clone the repository on your computer.

Then, go to the directory ***chatsystem/***.

If your computer can execute make commands, you can just use the terminal command : *make install*.

Otherwise, you will have to use this terminal command : *mvn compile package*.

You will now have a new directory named ***target/***.

On it you will find 2 .jar files : ***ChatSystem.jar*** and ***ChatSystem-jar-with-dependencies.jar***.

As we have some dependencies, the project runs with the fat jar ***ChatSystem-jar-with-dependencies.jar***.

You have successfully installed the ChatSystem !
To use the software, you will just need Java and the fat jar ***ChatSystem-jar-with-dependencies.jar***.

V. Simplified User's Guide

This software will allow you to chat with people on the same network domain.
You must be connected to the same local network as others for it to work (company's network, local network).

You can launch the software with the commands :

- *make launch* (if your computer can execute make commands)
- *java -jar target/ChatSystem-jar-with-dependencies.jar*
- *java -cp target/ChatSystem-jar-with-dependencies.jar chatsystem.ChatSystem*

When using the software, the first step is to connect. A small window will appear asking for your username. After typing a username, you can click on the connect button or push Enter.

If the username is valid, the connecting window will disappear then the main window of the program will appear. If it is not valid, meaning that someone is using the software with that username, an alert window will appear notifying you that you have to change it. You can close it and retry until the value is valid.

On the main window, you will see your username displayed at the top and a button next to it to modify it. The username modification process is similar to the connecting phase.
At the centre of the main window, you will be able to see other users. These users are connected when their status is green. If it's grey, it means they are disconnected.

You can start a conversation with any connected user by clicking on them in the table. By doing so with a disconnected user, you would be able to see the messages history but you won't be able to send them messages (an alert will appear if you try).
A new incoming message will be highlighted on the main menu.

If you close a chat window with a connected user, you will still be able to receive their messages as long as both of you are connected.

When a user disconnects, his status will change immediately and if you were having a chat session, the window will close. The user will still remain on your users' list.

Closing the main menu window will terminate the program, you will be disconnected from the chat system and other user will be notified.

An alert window telling you that you have to close the ChatSystem will appear when the system bugs.

You cannot start the program if it's already running on your computer.

VI. Project organisation

Here are tools (from our "Gestion de projet" and "Processus de développement automatisé" courses) we used to make working together easier.

1. Git

Link : https://github.com/tranxuanhaiminh/ChatSystem

As it was a team project, GitHub allowed us to work at the same time on different tasks and each task was done on a special git branch. When we finished, we would merge our branch on the master.
We were also working on multiple computers so by pushing our work on the git repository, we were able to get it on another computer.
Git was also very useful when we pushed something that has a lot of errors because we could go back to old versions.

2. Jira

Link : https://test65535.atlassian.net/jira/software/projects/SYS/boards/2/roadmap

With Jira, we were able to organise the project in an efficient way.
As you can see with our project link, we separated the project into 5 sprints, each sprint was about a week. Each sprint had a certain number of tasks.

The project was about building a new system and it was the first time ever that we worked with java on a project. As a result we couldn't follow the sprints as planned and most of the work is done at the end and the first few weeks were used to get to know java, to how to use TCP/UDP connection properly, database creation/connection and java thread management.

Jira was also a good tool when working on a team project because as we defined tasks in detail, each task was assigned to someone and they knew exactly what they had to do. It was also great to be able to see our progress.

3. Jenkins

We each did 3 Jenkins jobs that were all Maven projects.
Our first job had to scan our GitHub repository and build (mvn clean compile) the project that was on the master branch when something changed, the second job had to build the project on our computer and the last one had to deploy the project (mvn package to create the fat jar).
We created a pipeline between the jobs following the same sequence.
Hence, whenever we pushed something on the git repository, the first job compiles the master branch and if there was no error, the project on our computer would be compiled and the .jar file created.
As we were pushing our work on GitHub even if it was not finished (to be able to pull it on another computer), we had a few compilation errors because of the second job but it was not an issue as it was the unfinished version on our computer which was on a local git branch.

VII. Conclusion

This project allowed us to build a program from scratch. We run through the process of making a software starting from the design to the deployment. We discovered organisation methods for groups projects, and learned more about how git works in general, how eclipse manages the project via configuration files. Overall it was nice to be able to use these new tools that make coding, integrating and working with a team a lot easier.

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