COMP90015 Distributed System

Assignment 2: Distributed Shared White Board

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1. System Architecture

This project designs and implements a distributed shared white board, which allows multiple user to draw together on a shared whiteboard.

There are two roles in the system, one is manager and the other one is client. The first client connected to the server is regarded as manager, who have the right to create a whiteboard, refuse other clients to connect to join the whiteboard system, and kick out a certain client. Users connected after manager are regarded as clients, who are able to join the whiteboard. Both manager and client can see the user list of the whiteboard, and both can draw on the whiteboard.

The system consists of client part and server part. In client part, there are different GUIs for different roles and listeners.

2. Communication Protocols

The project uses RMI protocols as communication protocols. Messages such as user name, whiteboard image, user list information are transmitted between client and server. We designed an Remote Interface for message exchange.

3. Message Formats

Text messages such as user name are transmitted in String type. Images are synchronized by byte array. User name list messages are transmitted in ArrayList<String> type.

4. Design Diagrams

The class diagram for the project is shown in Figure 1.

There is one remote interface named RMI, all functions in RMI are implemented in class Client and RMIServer.

RMIServer is used to store images and user information. All the clients are connected to Server and transmits messages with Server.

Once a client enter a host name, a port number and a username in ConnectionWindow, the system would check whether he can connect to the server. If connected successfully, the system would check the role of the client. If the role is Manager, then the ManagerGUI would be presented, else the ClientGUI would be presented. And if the user presses button *Join WhiteBoard* in clientGUI or *Create WhiteBoard* in ManagerGUI*,* a WhiteBoard window would be displayed. Both manager and client can draw on WhiteBoard.

When a manager creates a WhiteBoard, a WhiteBoard would be created on Server side. Each time when clients edit on their own WhiteBoard, WhiteBoard on Server side would update. And when WhiteBoard on Server side changes, each client's WhiteBoard would update.

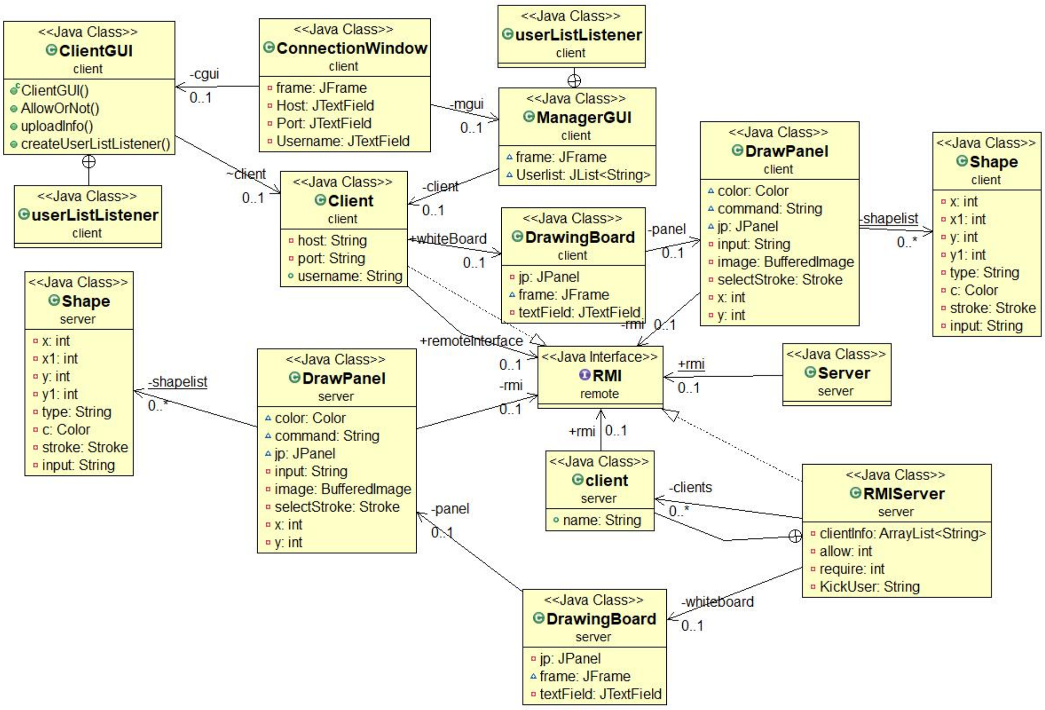


Figure1 Class Diagram

5. Implementation Details

5.1 Connection Window

5.1.1 Connection Window GUI

As shown in Figure 2, the connection window GUI consists of three textfield and a CONNECT button. Users need to enter a host name, a port number and a username before clicking CONNECT button to connect to the server.

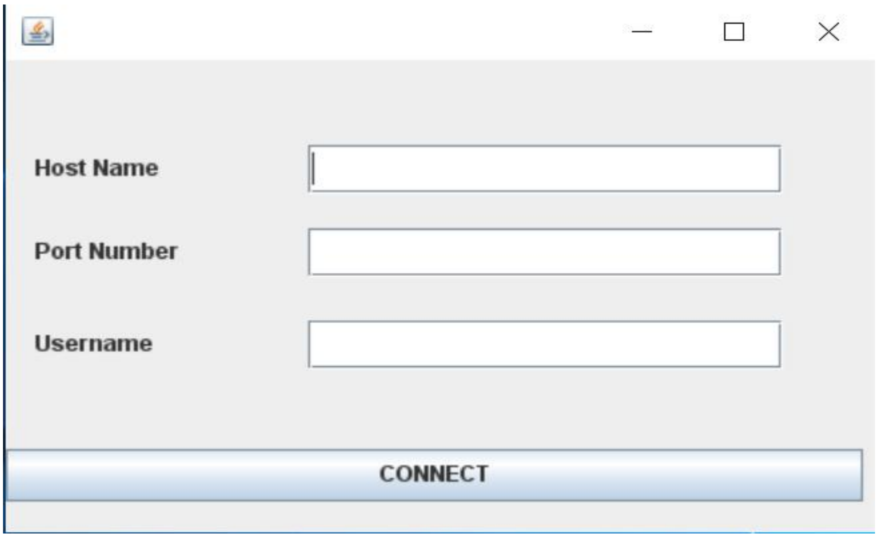
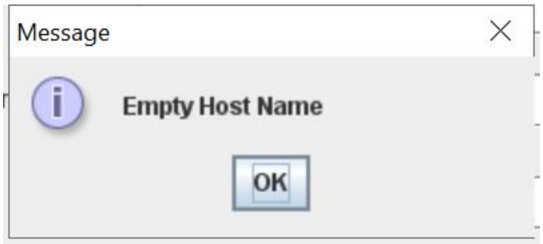


Figure 2 Connection Window GUI

5.1.2 Error Failure handling

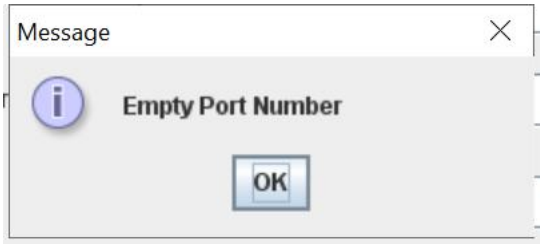
If there existed some errors when trying to connect to the server, a message dialog would be shown and tells the user what is the error.

Firstly, all the three textfields cannot be empty.


Message

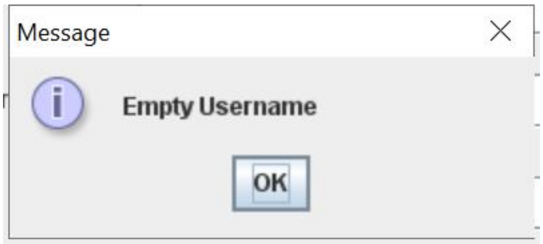
Empty Host Name

Figure 3 Empty Host Name


Message

Empty Port Number

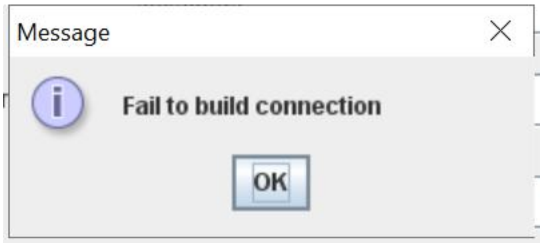
Figure 4 Empty Port Number


Message

Empty Username

Figure 5 Empty Username

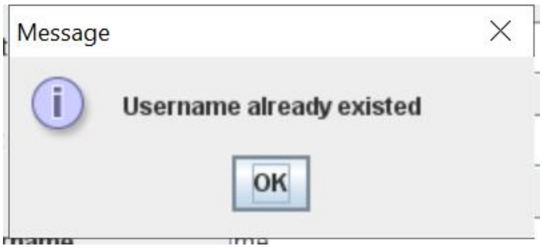
Secondly, if the client cannot connect to the server with the host name and the port number, a warning message would be shown.


Message

Fail to build connection

Figure 6 Fail to build connection

Thirdly, if the username entered is already exists in WhiteBoard system, a message would also be shown.


Message

Username already existed

Figure 7 Username existed error

5.2 ManagerGUI

5.2.1 GUI

As shown in Figure 8, a ManagerGUI consists of a Userlist, a *Create WhiteBoard* button, and a *Kick* button.

A manager can create a WhiteBoard by clicking *Create WhiteBoard* button. Usernames of all clients including the manager would be presented in the Userlist. The manager can select a user in the userlist and kick out him from the system by clicking *Kick* button.

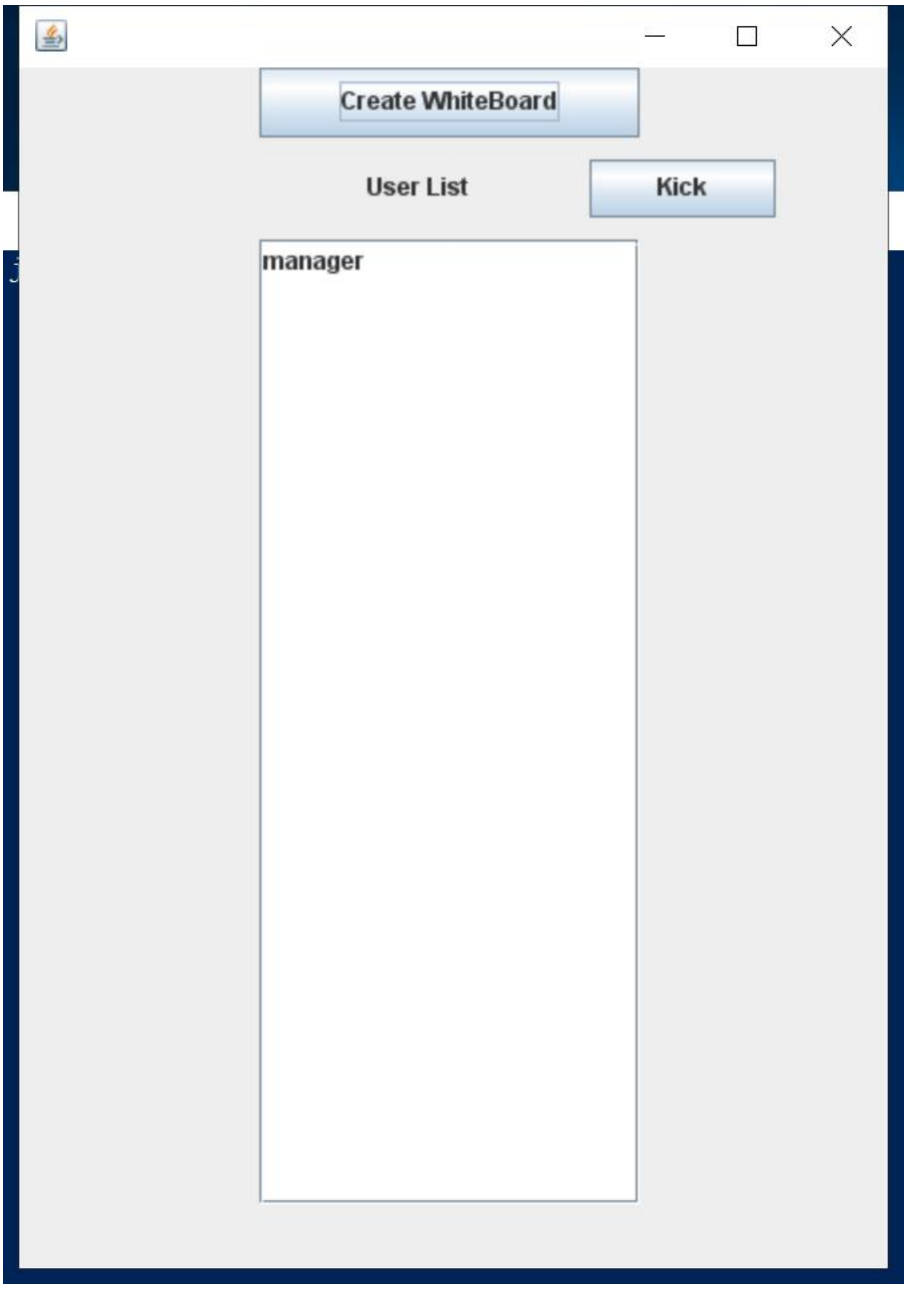
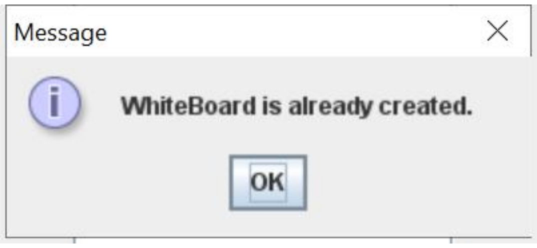


Figure 8 ManagerGUI

5.2.2 Failure handling

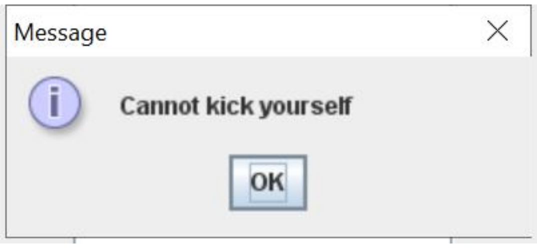
Firstly, there could be only one WhiteBoard at a time. If the manager wants to create a new WhiteBoard, an error would occur.



WhiteBoard is already created.

Figure 9 WhiteBoard Existed

Secondly, if the manager wants to kick out himself, an error would occur.

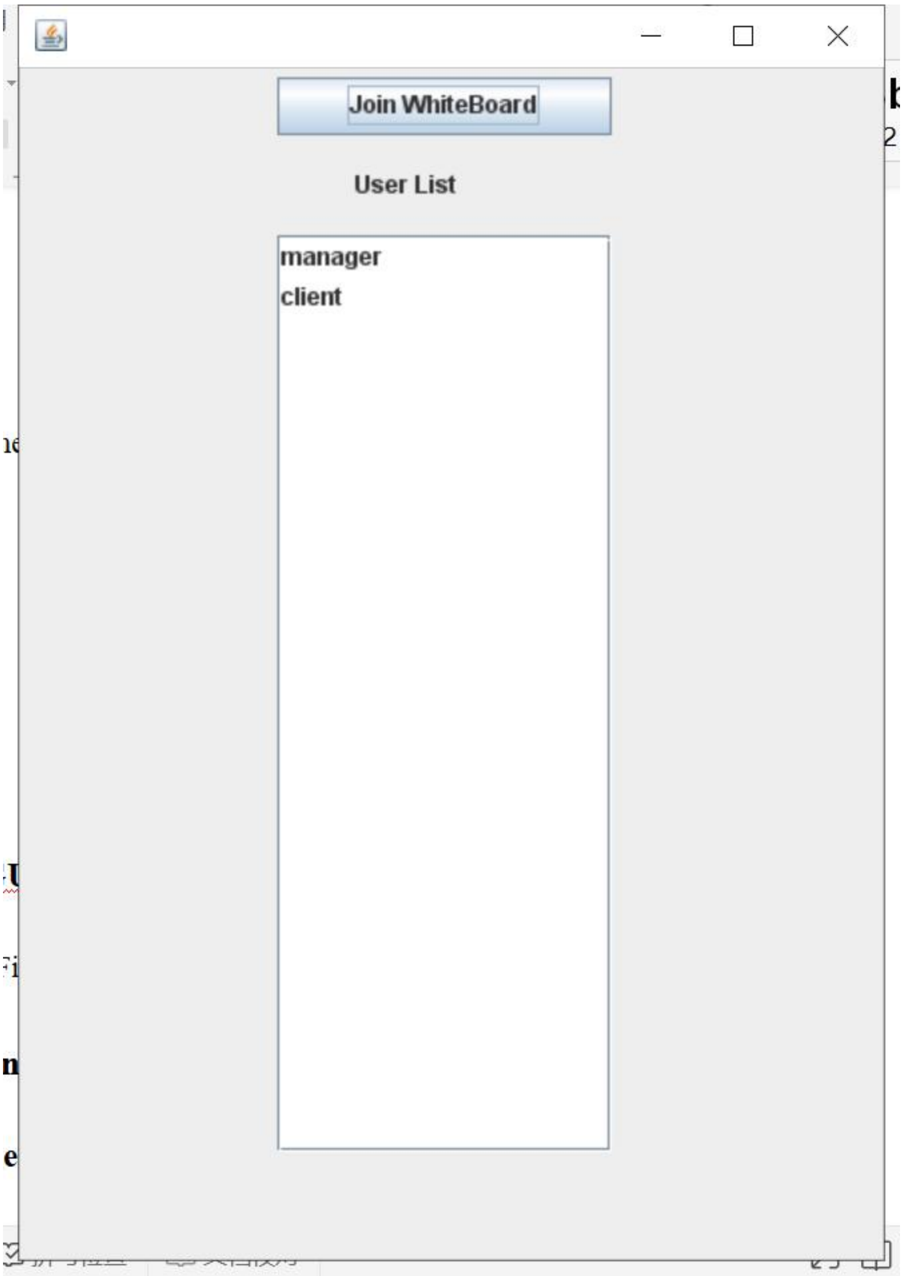


Cannot kick yourself

Figure 10 Cannot Kick Manager

5.3 ClientGUI

As shown in Figure 11, the ClientGUI is similar to ManagerGUI. It is made up of a Userlist and a Join *WhiteBoard* button.

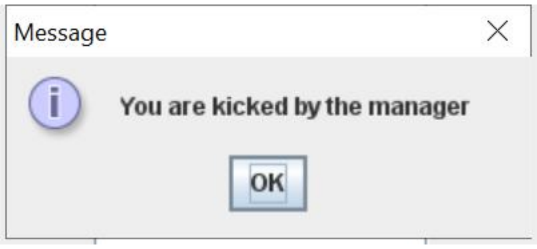


manager
client

Figure 11 Client GUI

5.3.2 Error Failure handling

When a client is kicked by the manager, a reminder would be shown.



Message

You are kicked by the manager

Figure 12 Kicked By The Manager

5.4 WhiteBoard

As shown in Figure 12, a WhiteBoard is made up of a toolBar,a drawing canvas and a textfield. Users are able to select color by clicking color buttons and select shapes by clicking shape buttons. In the WhiteBoard, users can draw a line, a rectangular or an oval. Also, the user can add text into the canvas by typing some words in textfield, clicking *Text* button and choose a location.

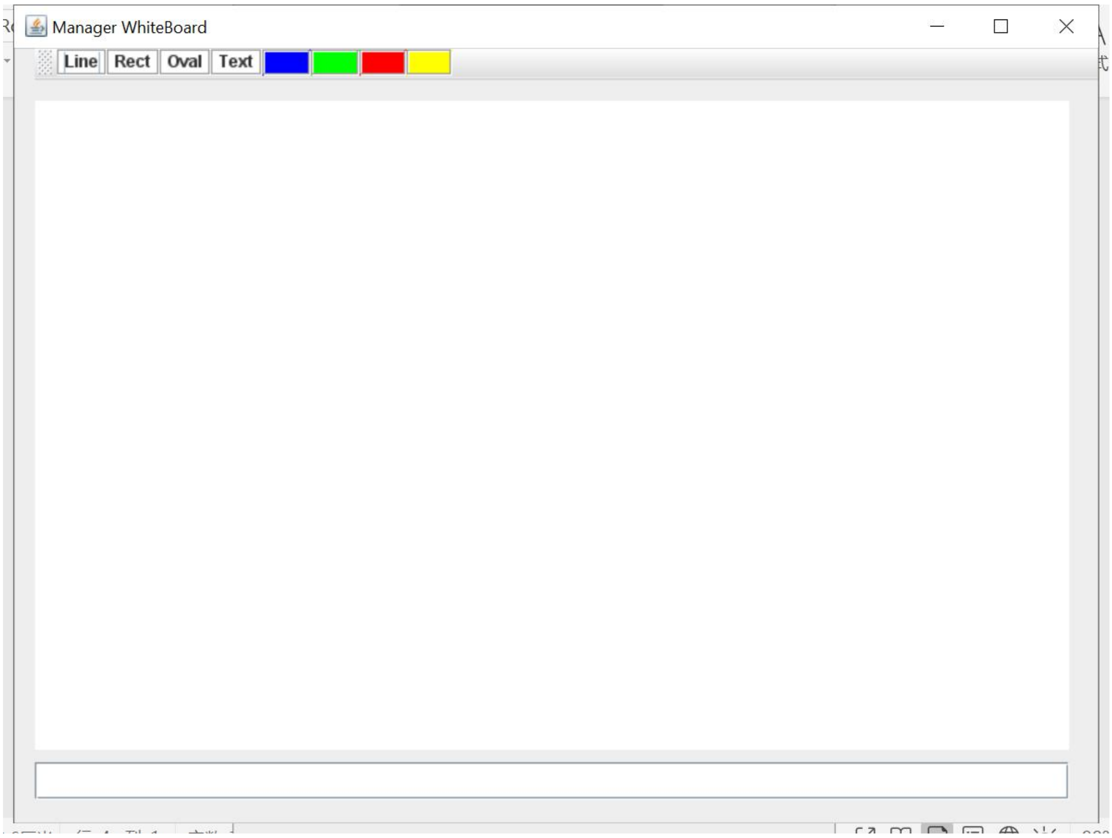
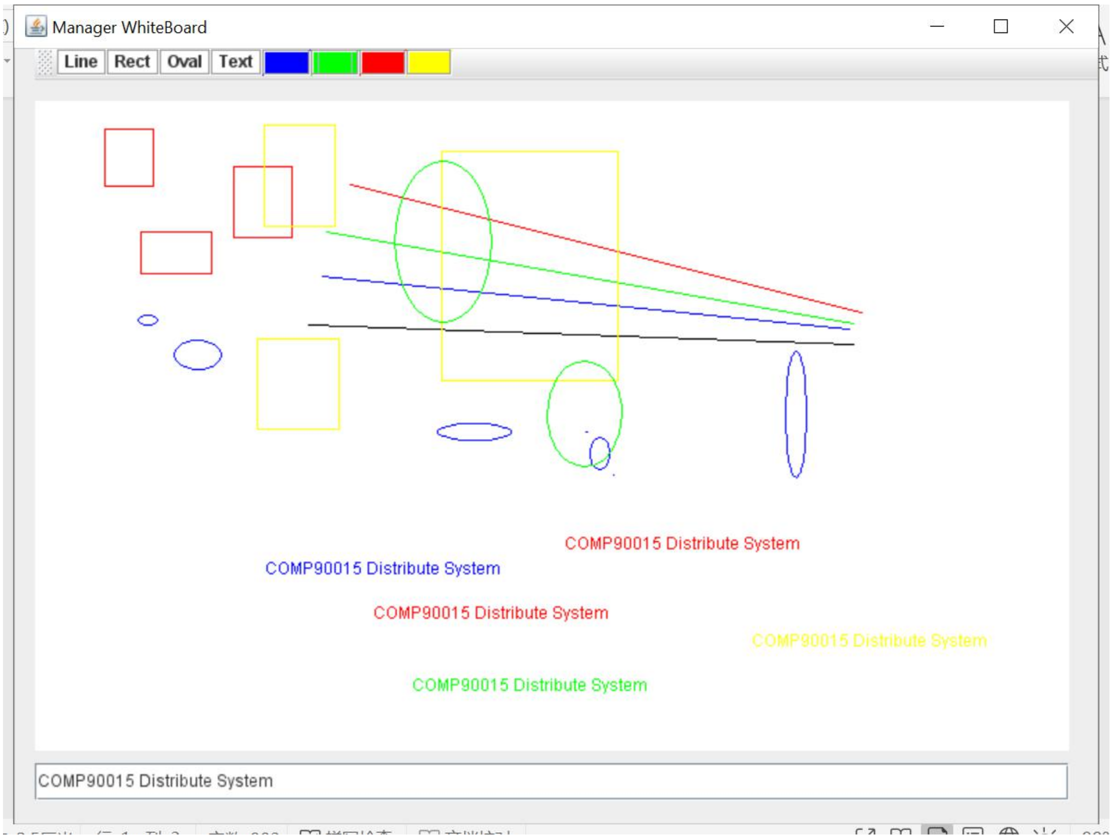


Figure 12 WhiteBoard GUI


Manager WhiteBoard
Line
Rect
Oval
Text
COMP90015 Distribute System
COMP90015 Distribute System
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COMP90015 Distribute System

COMP90015 Distribute System

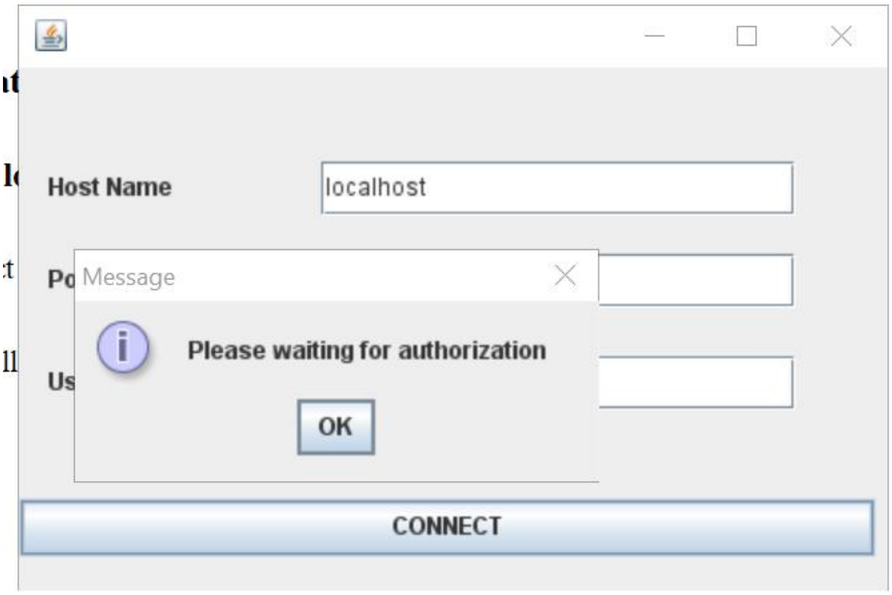
Figure 13 WhiteBoard

6. New Innovations

6.1 Manager allow in function

A client can connect to the server only with the manager’s permission.

When a client is willing to connect to the server, a message would be presented in Connection Window.



Host Name

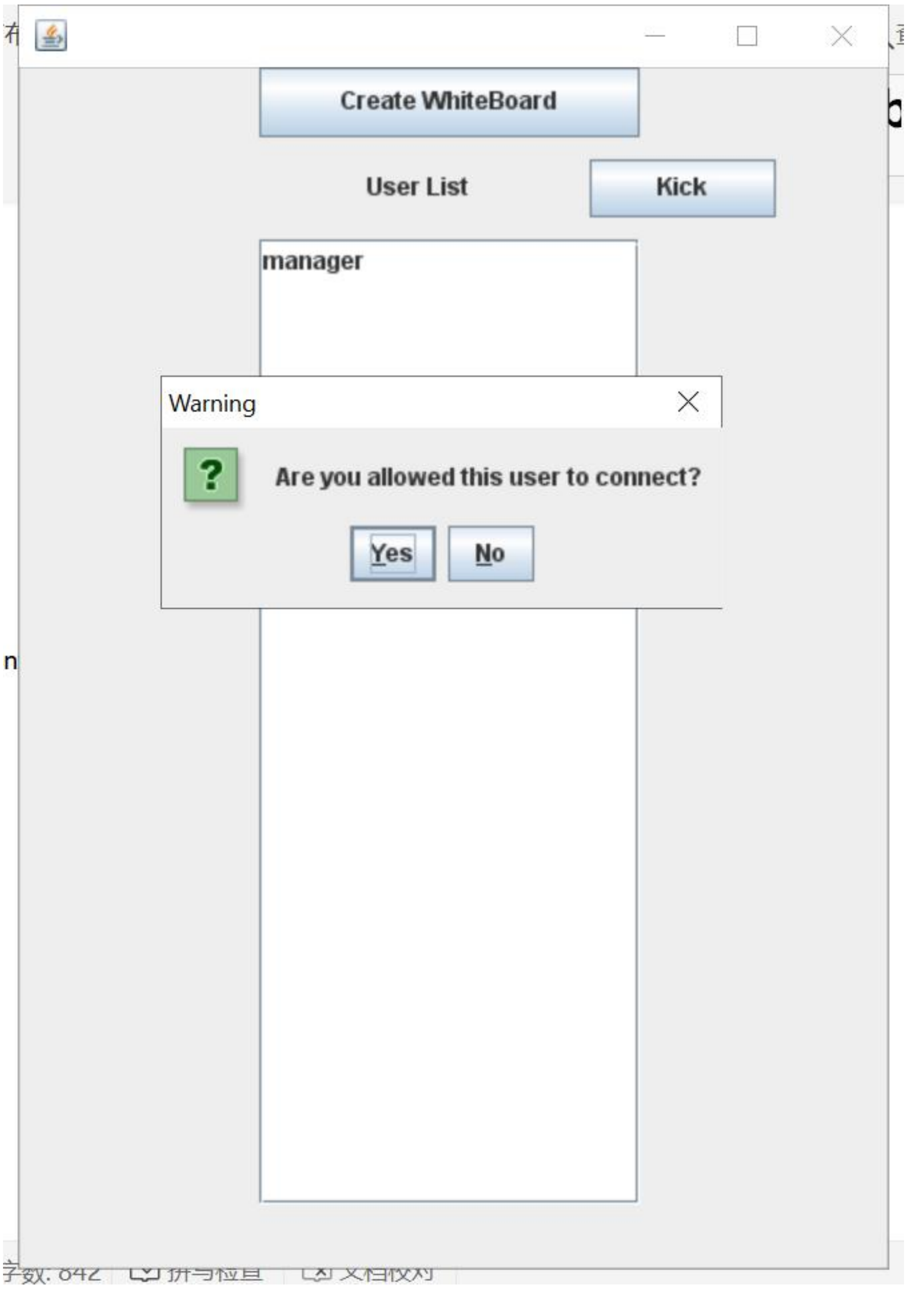
localhost

Message

Please waiting for authorization

Figure 14 Waiting For Authorization

Meanwhile, a dialog would shown in ManagerGUI to ask for permission.

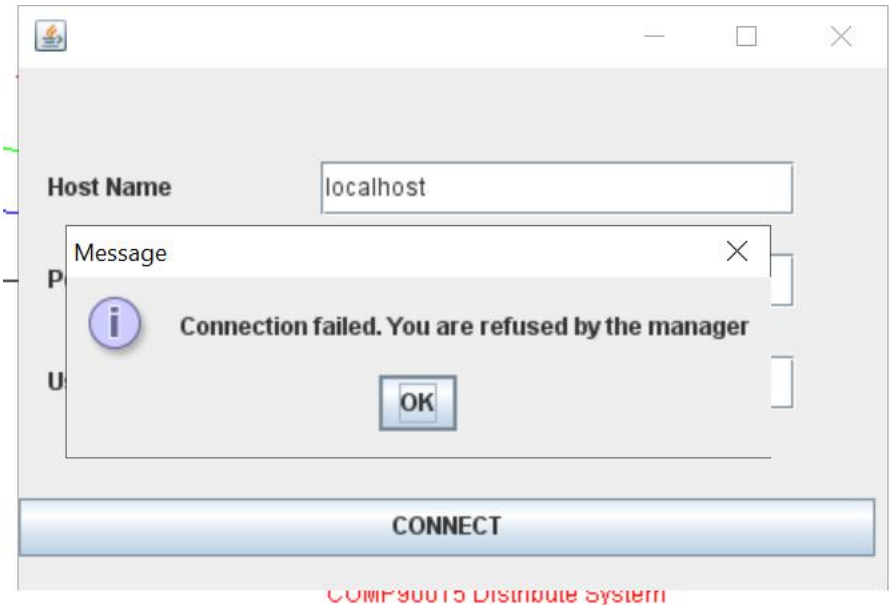


Warning

Are you allowed this user to connect?

Figure 15 Ask For Permission

If the manager allows the client to connect, the client can go to ClientGUI successfully. But if the manager refuses, the client would fail to go to ClientGUI and a message would be shown.



Connection failed. You are refused by the manager

Figure 16 Refused By the Manager