LAN UTILITY

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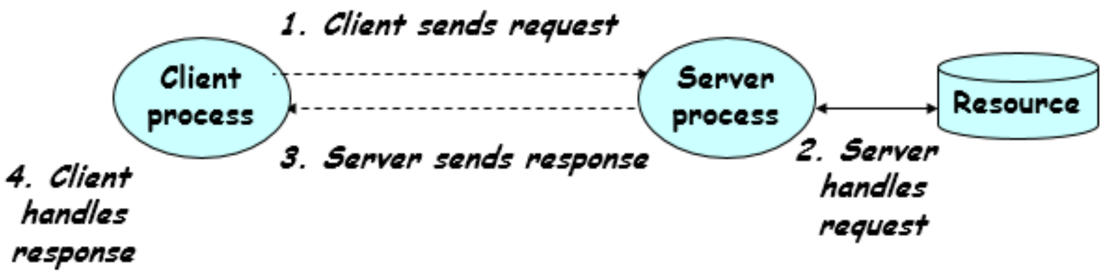
ABSTRACT

A LAN Utility is a software / application which is used for the establishment of connection between two or more people/systems by just connecting to the same network without any internet access. This type of utility enable people to connect and exchange information easily.

Implementation of LAN messenger now a days is a simple task which is made easier through socket programming followed by instant messaging (IM). Not only a messenger but also a lot more applications are possible through LAN. Digitalization is one major aspect in which India is very much lagging behind. This digitalization should be one of the key aspects on which both government and society should concentrate upon. This LAN utility enables digitalization in education as: for example, a lecturer wants to give a lecture, if every student and the lecturer are connected to the same network, this utility works in such a way that whatever the lecturer wants to convey through writing it on the board, if he writes it on his screen, it would reflect on every system and if any one of the students want to send some information, it would be shared with all.

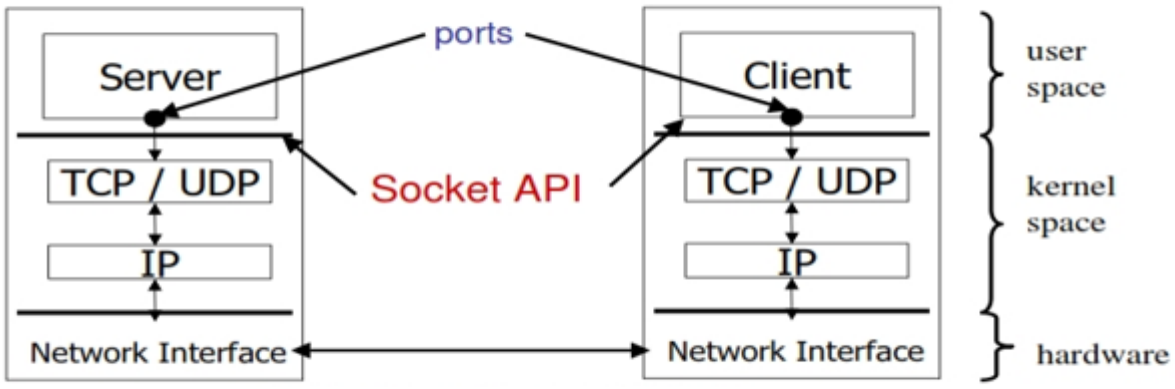
Client – Server mechanism

Socket Programming going hand in hand with client server mechanism gives the maximum through put to have a distinguished result.

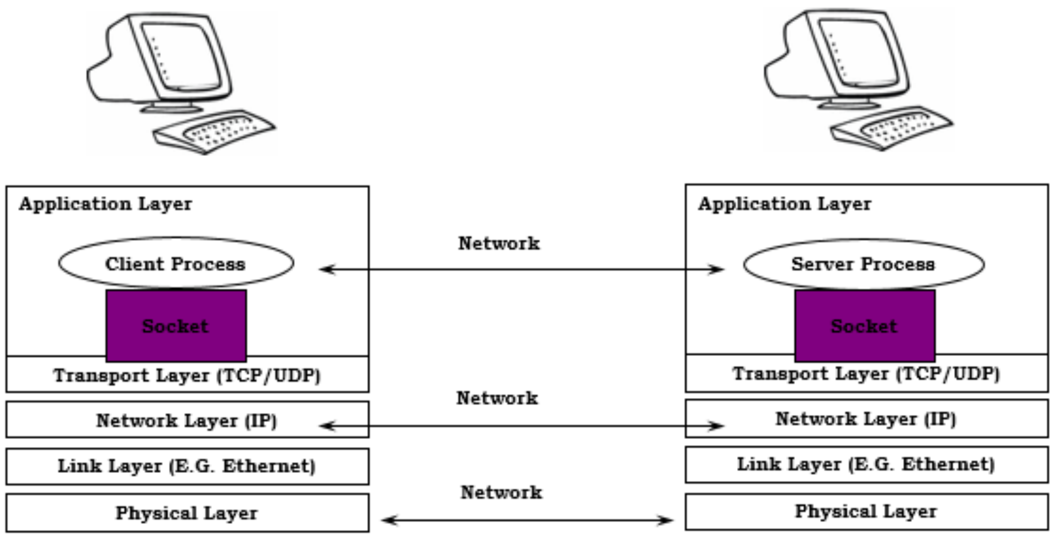


Client asks (*request*) – server provides (*response*). Typically a single server handles multiple clients but there can even be multiple servers handling multiple clients depending upon the number of clients and system resources. The server does not need to know *anything* about the client even that it exists but the client should always know *something* about the server at least where it is located. Clients and servers are processes running on network hosts i.e. they have to connect to a particular network (need not have internet access). They may be on the same host to be connected to each other for better transmission.

Sockets are used for inter process communication. Most of the inter-process communication follow a Client – Server model where client and server are two different processes. Server and Client exchange messages over the network through a common socket API.



The network interface is provided by the operating system in this way.



The IP address in the server socket address identifies the host

The (well-known) port in the server socket address identifies the service, and thus implicitly identifies the server process that performs that service.

Examples of well-known ports:

Port 7: Echo server

Port 23: Telnet server

Port 25: Mail server

Port 80: Web server

Servers are long-running processes (daemons). Created at boot-time (typically) by the init process (process 1). Run continuously until the machine is turned off. Each server waits for requests to arrive on a well-known port associated with a particular service. Other applications should choose between 1024 and 65535

To the kernel, a socket is an endpoint of communication. To an application, a socket is a file descriptor that lets the application read/write from/to the network. All Unix I/O devices, including networks, are modeled as files. Clients and servers communicate with each by reading from and writing to socket descriptors. The main distinction between regular file I/O and socket I/O is how the application “opens” the socket descriptors.

Modules

Messaging module:

As already explained, LAN messenger is made using TCP chat application. These are some of the steps involved in TCP protocol.

Server:

Step 1: Creating Socket

Step 2: Binding the socket with the system and port as information exchange channel.

Step 3: Listen to any connection requests being received to the server from any client.

Step 4: Accept the connection.

Step 5: Perform the actions requested by the client or ask the client to perform your desired actions. Actions here mean exchange of information (LAN Messenger)

Step 6: Close the socket.

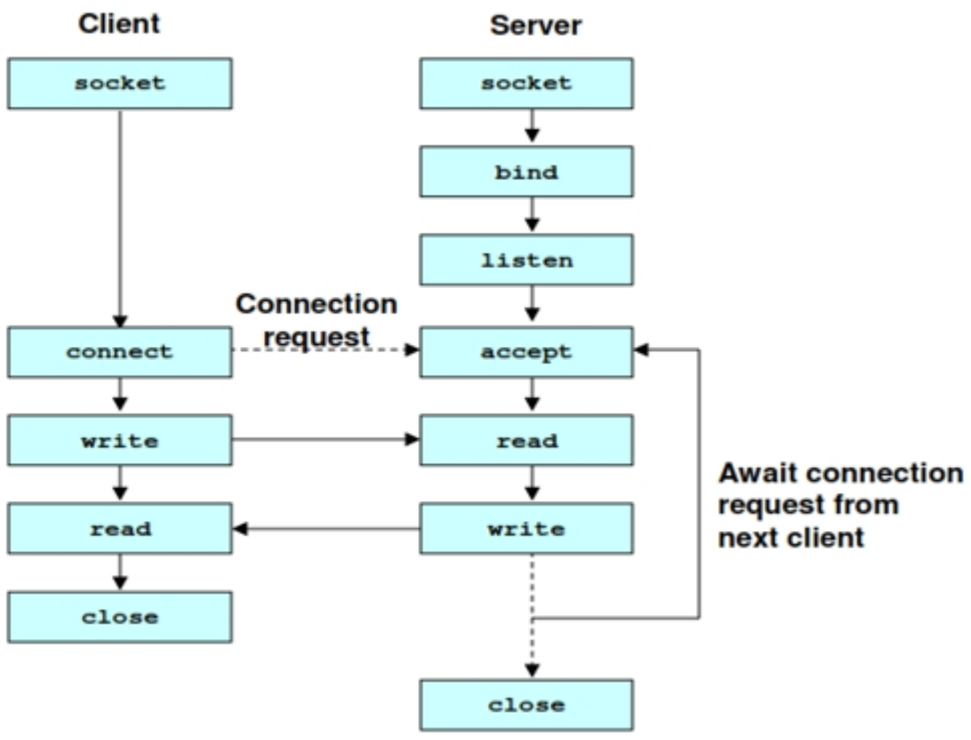
Client:

Step 1: Create the socket

Step 2: Request connection to the server.

Step 3: Exchange information with the server once the connection is established.

Step 4: Close the socket.



GUI Module:

Graphical User interface plays an important and one of the major roles in any application. Impression of the user is one basic aspect in which a developer/programmer should not override his thoughts and provide an impressive GUI for a utility to have its votes.

Utility Module:

To decide such a utility in a comprehensive manner, JAVA has been used to code the board module of the utility. Pen tip size, pseudo color configuration (214 combinations of RGB colors) and some other utilities have been added into the code and a flawless application/utility has been prepared.

The JAVA Code used is:

Message.java

```
package com.compnet.jlm.core.message;

import com.compnet.jlm.core.messenger.Messenger;
import java.beans.PropertyChangeListener;
import java.beans.PropertyChangeSupport;
import java.io.IOException;
import java.util.logging.Level;
import java.util.logging.Logger;

/**
 *
 * @author Nikesh
 */

/*
 * Message.java
 *
 * this class impliments a message object
 */
public class Message {

    // textual message
    private String message = null;
    // messenger associated with this message
    private Messenger messenger = null;

    //--------------------- GETTERS AND SETTERS ------------------------------
    public String getMessage() {
        return message;
    }

    public void setMessage(String message) {
        // set the message content
        this.message = message;
        // firing the property change
        // in-order to be listened by the property change listner components
        this.propertyChangeSupport.firePropertyChange(messageProperty, 0, 1);
    }

    public Messenger getMessenger() {
        return messenger;
    }

    public void setMessenger(Messenger messenger) {
        this.messenger = messenger;
    }
    /*
     * sendMessage Method
     * to send the current message using the messenger
     */
    public void sendMessage(String newMessage) {
        try {
            // send the message content using the messenger
            messenger.sendMessage(newMessage);
        } catch (IOException ex) {
            Logger.getLogger(Message.class.getName()).log(Level.SEVERE, null, ex);
        }
    }
    // -------------------- Property Change Listner --------------------------
    // message property name
    private String messageProperty = "MESSAGE_CHANGED";
    // property change support object
    private PropertyChangeSupport propertyChangeSupport = new
PropertyChangeSupport(this);

    /*
     * addPropertyChangeListener Method
     * used by listners for this message for adding themself as a listner for this
message
     */
    public void addPropertyChangeListener(PropertyChangeListener listener) {
        propertyChangeSupport.addPropertyChangeListener(listener);
    }

    /*
     * removePropertyChangeListener Method
     * used by listners for this message for removing themself as a listner for this
message
     */
    public void removePropertyChangeListener(PropertyChangeListener listener) {
        propertyChangeSupport.removePropertyChangeListener(listener);
    }

    // ------------------ MessegeProperty Getter and Setter -------------------
    public String getMessegeProperty() {
        return messageProperty;
    }

    public void setMessegeProperty(String messageProperty) {
        this.messageProperty = messageProperty;
    }
}
```

FilterTypes.java

```
package com.compnet.jlm.core.message.filters;

/**
 *
 * @author Nikesh
 */

/*
 * FilterTypes.java
 *
 * this final class provides text filter types
 */
public final class FilterTypes {

    // text filter for chat messages
    public static final int TEXT_FILTER = 40000;
    // control filter for whiteboard control messages
    public static final int CONTROL_FILTER = 40001;
    // message type value location index
    //- index where the type value is present in the recieved string message
    public static final int TYPE_LOC_INDEX = 0;
}
```

MessageFilter.java

```
package com.compnet.jlm.core.message.filters;

import com.compnet.jlm.core.message.Message;
import java.beans.PropertyChangeEvent;
import java.beans.PropertyChangeListener;

/**
 *
 * @author Nikesh
 */

/*
 * MessageFilter.java
 *
 * this class impliments message filter used to filter messages according to
 * the filter types
 */
public class MessageFilter implements PropertyChangeListener {
```

```
// the raw message
private Message rawMessage = null;
// the filtered message
private Message filteredMessage = null;
// filter type variable
private int filterType = 0;

/*
 * class constructor with input message and the filter type
 */
public MessageFilter(Message inputMessage, int filterType) {
   // set the filter type
   this.setFilterType(filterType);
   // set the input raw message
   this.setInputMessage(inputMessage);
}

/*
 * getter and setter for filter types
 */
public int getFilterType() {
   return filterType;
}

public final void setFilterType(int filterType) {
   this.filterType = filterType;
}

/*
 * Getter for the filter message
 *
 * Note:- NO need for filtered message setter
 */
public Message getFilteredMessage() {
   return filteredMessage;
}

/*
 * method to set the input message as the raw message
 */
public final void setInputMessage(Message inputMessage) {
   // set the input message as the raw message
   rawMessage = inputMessage;
   // add this filter as a listner to the raw message object
   rawMessage.addPropertyChangeListener(this);
   // create the filtered message
   filteredMessage = new Message();
```

```
        // assign the filterd message messenger with the raw message messenger
        filteredMessage.setMessenger(rawMessage.getMessenger());
    }

    /*
     * method invoked on property change event
     * - ie raw message message content changed event
     */
    public void propertyChange(PropertyChangeEvent evt) {
        try {
            // if the message content type is equal to the assigned filter type then
            if (rawMessage.getMessage().charAt(FilterTypes.TYPE_LOC_INDEX) ==
(char) filterType) {
                // set the filtered message content
                // - remove the content filter type value
                filteredMessage.setMessage(rawMessage.getMessage().substring(1));
            }
        } catch (StringIndexOutOfBoundsException ex) {
            // runtime error skipping` ...
        }
    }
}
```

MessageReader.java

```
package com.compnet.jlm.core.message.reader;

import com.compnet.jlm.core.message.Message;
import com.compnet.jlm.core.message.filters.FilterTypes;
import com.compnet.jlm.core.messenger.Messenger;
import java.io.IOException;
import java.util.logging.Level;
import java.util.logging.Logger;

/**
 *
 * @author Nikesh
 */

/*
 * MessageReader.java
 *
 * this class impliments a message reader
 */
public class MessageReader {
    // the message object
    private Message message;
    // the messenger reference object
    private Messenger messengerInterface;
    // flag to stop reading
    private boolean stop = false;
    // runnable Reader class object
    private Reader reader = null;
    // thread for reader runnable
    private Thread thread = null;

    /*
     * privatising default constructor inorder to prevent usage
     */
    private MessageReader() {
    }

    /*
     * class constructor with message object and messenger reference object as
parameter
     */
    public MessageReader(Message msg, Messenger msngrInterface) {
        // set the message object
        this.message = msg;
        // set the messenger object
        this.messengerInterface = msngrInterface;
        // create reader
        reader = new Reader();
        // create thread for the reader
        thread = new Thread(reader);
    }

    /*
     * method to start reading messages
     */
    public void startReading() {
        // set stop flag as false
        stop = false;
        // start the thread for reader runnable
        thread.start();
    }

    /*
     * method to stop reading messages
     */
    public void stopReading() {
        // set stop flag to true
        stop = true;
    }

    /*
     * Reader Class
     *
     * this runnable class impliments the run method to read the message
     * continiously from the messenger
     */
    private class Reader implements Runnable {

        @Override
        public void run() {
            // read till stop equals true
            while (!stop) {
                try {
                    // read the message from messenger and set it to the message object
                    message.setMessage(messengerInterface.recieveMessage());
                } catch (IOException ex) {

Logger.getLogger(MessageReader.class.getName()).log(Level.SEVERE, null, ex);
                } catch (NullPointerException ex) {
                    // null pointer exception found when the other side connection is closed
                    // so inform the user through the message
                    message.setMessage((char) FilterTypes.TEXT_FILTER + "INFO: Other
side connection closed.");
                    // stop the message reading
                    stop = true;
                }
            }
        }
    }
}
```

Messenger.java

```
package com.compnet.jlm.core.messenger;

import java.io.IOException;

/**
 *
 * @author Nikesh
 */
/*
 * Messenger.java
 *
 * This interface contains all the abstract functions a messenger must have
 */
public interface Messenger {

    /*
     * connect method
     * to connect to a specific ip at port with id portId
     */
    public void connect(String ip, int portId) throws IOException;

    /*
     * sendMessage method
     * to send a string message to the other side
     */
    public void sendMessage(String message) throws IOException;

    /*
     * recieveMessage method
     * to recieve messege sent from the other side
     */
    public String recieveMessage() throws IOException;

    /*
     * disconnect method
     * to disconnect the connection with the other side
     */
    public void disconnect() throws IOException;

    /*
     * isConnected method
     * to check the connection status
     */
    public boolean isConnected() throws IOException;
}
```

MessengerAbstraction.java

```
package com.compnet.jlm.core.messenger;

import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStream;
import java.io.PrintWriter;
import java.net.ServerSocket;
import java.net.Socket;

/**
 *
 * @author Nikesh
 */
/*
 * MessengerAbstraction.java
 *
 * this abstract class implements those methods of the Messenger
 * which have same implimentation.
 *
 * only the connect method is not implimented in here
 */
public abstract class MessengerAbstraction implements Messenger {

    // server socket object for connction if selected connection type is server
    private ServerSocket serverSocket;
    // a base socket object for both client and server
    private Socket socket;
    // inputstream object for reading reading the data/ message recieved at the socket
    private InputStream inputStream;
    // buffered reader object to provide a wrapper to the inputstream for reading
message
    private BufferedReader bufferedReader;
    // print writer object to write message onto the socket
    private PrintWriter printWriter = null;
    // message string object
    private String readMessage = null;

    /*
     * getter and setter for Messenger objects
     *
     * to be used by the classes which extends this Messenger abstraction class
     */
    public BufferedReader getBufferedReader() {
        return bufferedReader;
    }

    public void setBufferedReader(BufferedReader bufferedReader) {
        this.bufferedReader = bufferedReader;
    }

    public InputStream getInputStream() {
        return inputStream;
    }

    public void setInputStream(InputStream inputStream) {
        this.inputStream = inputStream;
    }

    public PrintWriter getPrintWriter() {
```

```
    return printWriter;
}

public void setPrintWriter(PrintWriter printWriter) {
    this.printWriter = printWriter;
}

public ServerSocket getServerSocket() {
    return serverSocket;
}

public void setServerSocket(ServerSocket serverSocket) {
    this.serverSocket = serverSocket;
}

public Socket getSocket() {
    return socket;
}

public void setSocket(Socket socket) {
    this.socket = socket;
}

/*
 * Messenger Implimentation
 */
/*
 * send message methos to send message
 */
public void sendMessage(String message) throws IOException {
    printWriter.println(message);
}

/*
 * recieve message to recieve the sent message from the other side
 */
public String recieveMessage() throws IOException, NullPointerException {
    // using buffered reader to read a line of the message
    readMessage = bufferedReader.readLine();
    // if the read data is null then throw null pointer exception
    if (readMessage == null) {
        throw new NullPointerException();
    }
    // else return the read message string
    return readMessage;
}

/*
```

```
     * disconnect method to disconnect the socket connection
     */
    public void disconnect() throws IOException {
        // close socket
        socket.close();
        // if server socket is present then close it
        if (serverSocket != null) {
            serverSocket.close();
        }
    }

    /*
     * isConnected method to check the connection status
     */
    public boolean isConnected() throws IOException {
        // return socket connection status
        return socket.isConnected();
    }
}
```

MessengerClient.java

```
package com.compnet.jlm.core.messenger.client;

import com.compnet.jlm.core.messenger.MessengerAbstraction;
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.io.PrintWriter;
import java.net.Socket;

/**
 *
 * @author Nikesh
 */
/*
 * MessengerClient.java
 *
 * this class extends from the MessengerAbstraction abstract class
 * and provides the implimentation for the connect method for the client type
 */
public class MessengerClient extends MessengerAbstraction {

    /*
     * connect method as defined in the MessengerInterface
     * used to connect to a server with ip and portId
     */
    public void connect(String ip, int portId) throws IOException {
        // creating the socket
        this.setSocket(new Socket(ip, portId));
        // set the inputstream
        this.setInputStream(this.getSocket().getInputStream());
        // set the buffered reader using the input stream; for reading data
        this.setBufferedReader(new BufferedReader(new
InputStreamReader(this.getInputStream())));
        // set the print writer; for writing data
        this.setPrintWriter(new PrintWriter(this.getSocket().getOutputStream(), true));
    }
}
```

MessengerServer.java

```
package com.compnet.jlm.core.messenger.server;

import com.compnet.jlm.core.messenger.MessengerAbstraction;
import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.io.PrintWriter;
import java.net.ServerSocket;

/**
 *
 * @author Nikesh
 */
/*
 * MessengerServer.java
 *
 * this class extends from the MessengerAbstraction abstract class
 * and provides the implimentation for the connect method for the server type
 */
public class MessengerServer extends MessengerAbstraction {

    /*
     * connect method as defined in the MessengerInterface
     * used to start the server connection
     */
    public void connect(String ip, int portId) throws IOException {
        // starting the server at port
        this.setServerSocket(new ServerSocket(portId));
        // creating the socket
        this.setSocket(this.getServerSocket().accept());
        // set the inputstream
        this.setInputStream(this.getSocket().getInputStream());
        // set the buffered reader using the input stream; for reading data
        this.setBufferedReader(new BufferedReader(new
InputStreamReader(this.getInputStream())));
        // set the print writer; for writing data
        this.setPrintWriter(new PrintWriter(this.getSocket().getOutputStream(), true));
    }
}
```

FileTransfer.java

```
package com.compnet.jlm.filetransferer;

/**
 *
 * @author Nikesh
 */
public class FileTransferer {

}
```

JLMFrame.java

```
package com.compnet.jlm.gui;

import com.compnet.jlm.core.message.Message;
import com.compnet.jlm.core.message.filters.FilterTypes;
import com.compnet.jlm.core.message.filters.MessageFilter;
import com.compnet.jlm.core.message.reader.MessageReader;
import com.compnet.jlm.core.messenger.Messenger;
import com.compnet.jlm.core.messenger.client.MessengerClient;
import com.compnet.jlm.core.messenger.server.MessengerServer;
import com.compnet.jlm.gui.components.ChatTextArea;
import com.compnet.jlm.utils.Calender;
import com.compnet.jlm.whiteboard.gui.WhiteBoardFrame;
import java.awt.event.KeyEvent;
import java.io.File;
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.IOException;
import java.io.InputStream;
import java.net.InetAddress;
import java.net.SocketException;
import java.net.UnknownHostException;
import java.util.Properties;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.imageio.ImageIO;
import javax.swing.JFileChooser;
import javax.swing.JOptionPane;

/**
 *
 * @author Nikesh
 */

/*
 * JLMFrame.java
 *
 * this class provides the gui front end for the JLM project
 */
public class JLMFrame extends javax.swing.JFrame {

   // a object reffernce of the Messenger
   // used to reffernce server or client based on user selection
   private Messenger messenger = null;
   // white board object
   private WhiteBoardFrame whiteBoard = null;
   // raw message object - which will be read by the reader
   private Message rawMessage = null;
   // text message object - filtered text message from the raw message
   private Message textMessage = null;
   // control message object - filtered control message from the raw message
   private Message controlMessage = null;
   // text message filter to filter out text message from raw message
   private MessageFilter textMessageFilter = null;
   // control message filter to filter out control message from raw message
   private MessageFilter controlMessageFilter = null;
   // message reader for continious reading from the socket
   private MessageReader messageReader = null;
   // chat text area object for displaying chat messages
   private ChatTextArea chatTextArea = null;
   // the current user name
   private String userName = null;
   // server ip
   private String ipString = null;
   // server port id
   private String portIdString = null;
   // the program startup date and time used in message logging
   private String chatStartUpDateAndTime = null;

   /**
```

```
     * Creates new form JLMFrame
     */
    public JLMFrame() {

        // initialise the chat text area
        // as it is reffernced by the frame textarea object ( customised generated code)
        chatTextArea = new ChatTextArea();
        // initilise the base components
        initComponents();
        // the frames default exit option is set to DO_NOTHING
        // so as to prevent exit while in connection
        // exit is only done by the exitJLM method

        // set the frame icon
        try {

this.setIconImage(ImageIO.read(getClass().getResource("/com/compnet/jlm/gui/reso
urces/chat_16x16.png")));
        } catch (IOException ex) {
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        }
        // initialise the white board object
        whiteBoard = new WhiteBoardFrame();
    }

    /**
     * This method is called from within the constructor to initialize the form.
     * WARNING: Do NOT modify this code. The content of this method is always
     * regenerated by the Form Editor.
     */
    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
    private void initComponents() {

        chatPanel = new javax.swing.JPanel();
        jScrollPane1 = new javax.swing.JScrollPane();
        frameTextArea = chatTextArea;
        userInputPanel = new javax.swing.JPanel();
        userInputTextField = new javax.swing.JTextField();
        userInputSendButton = new javax.swing.JButton();
        menuBar = new javax.swing.JMenuBar();
        fileMenu = new javax.swing.JMenu();
        saveChatMenuItem = new javax.swing.JMenuItem();
        exitMenuItem = new javax.swing.JMenuItem();
        connectionsMenu = new javax.swing.JMenu();
        serverMenuItem = new javax.swing.JMenuItem();
        clientMenuItem = new javax.swing.JMenuItem();
        closeConnectionMenuItem = new javax.swing.JMenuItem();
        whiteBoardMenu = new javax.swing.JMenu();
        showBoardMenuItem = new javax.swing.JMenuItem();
        helpMenu = new javax.swing.JMenu();
        myIpMenuItem = new javax.swing.JMenuItem();
        aboutMenuItem = new javax.swing.JMenuItem();
        helpMenuItem = new javax.swing.JMenuItem();


setDefaultCloseOperation(javax.swing.WindowConstants.DO_NOTHING_ON_CLOS
E);
        setTitle("JLM - Java LAN Messenger");
        addWindowListener(new java.awt.event.WindowAdapter() {
            public void windowClosing(java.awt.event.WindowEvent evt) {
                windowClosingEvent(evt);
            }
        });

        chatPanel.setBorder(javax.swing.BorderFactory.createTitledBorder("Chat"));

        frameTextArea.setEditable(false);
        frameTextArea.setColumns(20);
        frameTextArea.setRows(5);
        jScrollPane1.setViewportView(frameTextArea);

        javax.swing.GroupLayout chatPanelLayout = new
javax.swing.GroupLayout(chatPanel);
        chatPanel.setLayout(chatPanelLayout);
        chatPanelLayout.setHorizontalGroup(

chatPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING
)
            .addGroup(chatPanelLayout.createSequentialGroup()
                .addContainerGap()
                .addComponent(jScrollPane1, javax.swing.GroupLayout.DEFAULT_SIZE,
381, Short.MAX_VALUE)
                .addContainerGap())
        );
        chatPanelLayout.setVerticalGroup(

chatPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING
)
            .addGroup(chatPanelLayout.createSequentialGroup()
                .addContainerGap()
                .addComponent(jScrollPane1, javax.swing.GroupLayout.DEFAULT_SIZE,
98, Short.MAX_VALUE)
                .addContainerGap())
        );
```

```
userInputPanel.setBorder(javax.swing.BorderFactory.createTitledBorder("Input"));

        userInputTextField.setForeground(new java.awt.Color(0, 0, 204));
        userInputTextField.addKeyListener(new java.awt.event.KeyAdapter() {
            public void keyTyped(java.awt.event.KeyEvent evt) {
                inputTextField_KeyTypedEvent(evt);
            }
        });

        userInputSendButton.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/sen
d.png"))); // NOI18N
        userInputSendButton.setText("Send");
        userInputSendButton.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                inputSend_MousePressedEvent(evt);
            }
        });

        javax.swing.GroupLayout userInputPanelLayout = new
javax.swing.GroupLayout(userInputPanel);
        userInputPanel.setLayout(userInputPanelLayout);
        userInputPanelLayout.setHorizontalGroup(

userInputPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEA
DING)
            .addGroup(userInputPanelLayout.createSequentialGroup()
                .addContainerGap()
                .addComponent(userInputTextField,
javax.swing.GroupLayout.PREFERRED_SIZE, 294,
javax.swing.GroupLayout.PREFERRED_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
                .addComponent(userInputSendButton)
                .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))
        );
        userInputPanelLayout.setVerticalGroup(

userInputPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEA
DING)
            .addGroup(userInputPanelLayout.createSequentialGroup()
                .addContainerGap()

.addGroup(userInputPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alig
nment.BASELINE)
                    .addComponent(userInputTextField,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(userInputSendButton))
              .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))
        );

        fileMenu.setText("File");

        saveChatMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/sav
e.png"))); // NOI18N
        saveChatMenuItem.setText("Save Chat");
        saveChatMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                saveChatMenuItem_MousePressedEvent(evt);
            }
        });
        fileMenu.add(saveChatMenuItem);

        exitMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/exit
.png"))); // NOI18N
        exitMenuItem.setText("Exit");
        exitMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                fileExit_MousePressedEvent(evt);
            }
        });
        fileMenu.add(exitMenuItem);

        menuBar.add(fileMenu);

        connectionsMenu.setText("Connections");

        serverMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/ser
ver.png"))); // NOI18N
        serverMenuItem.setText("Server");
        serverMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                connectionsServer_MousePressedEvent(evt);
            }
        });
        connectionsMenu.add(serverMenuItem);

        clientMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/clie
nt.png"))); // NOI18N
        clientMenuItem.setText("Client");
        clientMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                connectionsClient_MousePressedEvent(evt);
            }
        });
        connectionsMenu.add(clientMenuItem);

        closeConnectionMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/dis
connect.png"))); // NOI18N
        closeConnectionMenuItem.setText("Close Connection");
        closeConnectionMenuItem.addMouseListener(new
java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                connectionsCloseConnection_MousePressedEvent(evt);
            }
        });
        connectionsMenu.add(closeConnectionMenuItem);

        menuBar.add(connectionsMenu);

        whiteBoardMenu.setText("WhiteBoard");

        showBoardMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/whiteboard/gui/re
sources/whiteBoardIcon_16x16.png"))); // NOI18N
        showBoardMenuItem.setText("Show Board");
        showBoardMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                showBoardMenuItem_MousePressedEvent(evt);
            }
        });
        whiteBoardMenu.add(showBoardMenuItem);

        menuBar.add(whiteBoardMenu);

        helpMenu.setText("Help");

        myIpMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/ip.p
ng"))); // NOI18N
        myIpMenuItem.setText("My IP");
        myIpMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                myIPMenuItem_MousePressedEvent(evt);
            }
        });
        helpMenu.add(myIpMenuItem);

        aboutMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/ab
out.png"))); // NOI18N
        aboutMenuItem.setText("About");
        aboutMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                helpAbout_MousePressedEvent(evt);
            }
        });
        helpMenu.add(aboutMenuItem);

        helpMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/hel
p.png"))); // NOI18N
        helpMenuItem.setText("Help");
        helpMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                helpHelp_MousePressedEvent(evt);
            }
        });
        helpMenu.add(helpMenuItem);

        menuBar.add(helpMenu);

        setJMenuBar(menuBar);

        javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
        getContentPane().setLayout(layout);
        layout.setHorizontalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGroup(layout.createSequentialGroup()
                .addContainerGap()

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADIN
G)
                    .addComponent(chatPanel,
javax.swing.GroupLayout.Alignment.TRAILING,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                    .addComponent(userInputPanel,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
                .addContainerGap())
        );
        layout.setVerticalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGroup(layout.createSequentialGroup()
                .addContainerGap()
                .addComponent(chatPanel, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
                .addComponent(userInputPanel,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addContainerGap())
        );

        pack();
    }// </editor-fold>

    /*
     * exitApp method
     * to exit from the application
     */
    private void exitAPP() {
        // set the messenger to null
        messenger = null;
        // set visibility to false
        this.setVisible(false);
        // dispose the gui resources
        this.dispose();
        // call garbage collector
        System.gc();
        // exit the application
        System.exit(0);
    }

    /*
     * exitJLM method
     * to exit from the JLM application
     */
    private void exitJLM() {
        try {
            // if messenger is initialised to client or server or is connected then
            if (messenger != null && messenger.isConnected()) {
                // ask the user, whether to terminate the live connection
                int r = JOptionPane.showConfirmDialog(rootPane, "Live Connection.
Terminate?", "Connection", JOptionPane.YES_NO_OPTION);
                // on user approval
                if (r == JOptionPane.YES_OPTION) {
                    // disconnect the connection
                    messenger.disconnect();
                    // exit the application
                    exitAPP();
                }
            } // if no connection then exit
            else {
                exitAPP();
            }
        } catch (SocketException ex) {
            JOptionPane.showMessageDialog(rootPane, "Connection Termination
Failed!\nSocket Exception:\n" + ex + "\nExiting.");
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
            exitAPP();
        } catch (IOException ex) {
            JOptionPane.showMessageDialog(rootPane, "Connection Termination
Failed!\nIO Exception:\n" + ex + "\nExiting.");
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
            exitAPP();
        } catch (NullPointerException ex) {
            // on null pointer exception do nothing
        } catch (Exception ex) {
            JOptionPane.showMessageDialog(rootPane, "Connection Termination
Failed!\nUnknown Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
            exitAPP();
        }
    }

    /*
     * fileExit_MousePressedEvent method
     * called when user selects the exit menu from the file menu of the menu bar
     */
    private void fileExit_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // exit JLM
        exitJLM();
    }

    /*
     * connectionsServer_MousePressedEvent method
     * called when user selects the server type connection from
     * the connections menu of the menu bar
     */
    private void connectionsServer_MousePressedEvent(java.awt.event.MouseEvent
evt) {
        // TODO add your handling code here:
        // connect only if no live connection
        if (messenger == null) {
            // get the server port id from the user
            portIdString = JOptionPane.showInputDialog(rootPane, "Enter Server Port ID
to set", "3333");
            try {
                // if user selects cancel then throw null pointer exception
                if (portIdString == null) {
                    throw new NullPointerException();
                }
                // convert the string port id to integer port id
                final int portId = Integer.parseInt(portIdString);
                // assign the Messenger reffernce object with MessengerServer object
                messenger = new MessengerServer();
                // notify the user about the connection delay
                JOptionPane.showMessageDialog(rootPane, "Starting Server. Please
Wait.");
                // start the server using a anonymous thread object with the port id
                // no ip required for the server type connection
                new Thread() {
                    @Override
                    public void run() {
                        try {
                            messenger.connect(null, portId);
                            updateMessages();
                            // notify the user about the successfull connection
                            JOptionPane.showMessageDialog(rootPane, "Chat Server started
at Port Id :" + portIdString, "Server Started",
JOptionPane.INFORMATION_MESSAGE);
                        } catch (IOException ex) {
                            JOptionPane.showMessageDialog(rootPane, "Could not start
Server using Port Id: " + portIdString, "Server Start Error",
JOptionPane.ERROR_MESSAGE);
                            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE,
null, ex);
                        }
                    }
                }.start();
                // get the user name to be used while chatting
                userName = JOptionPane.showInputDialog(rootPane, "Enter your chat
name", "Server");
                // if cancel pressed then set the default user name
                if (userName == null) {
                    userName = "Server";
                }
                // set the chat startup time - used in chat save
                chatStartUpDateAndTime = Calender.getCurrentDateAndTime();
            } catch (NullPointerException ex) {
                // if cancel option is selected by the user then do nothing
            } catch (NumberFormatException ex) {
                JOptionPane.showMessageDialog(rootPane, "Please Enter a valid Port
Id!", "Port ID Error", JOptionPane.ERROR_MESSAGE);
            } catch (Exception ex) {
                JOptionPane.showMessageDialog(rootPane, "Could not start Server using
Port Id: " + portIdString, "Server Start Error", JOptionPane.ERROR_MESSAGE);
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            }
        } else {
            // if currently connected (live connection) then notify user
            JOptionPane.showMessageDialog(rootPane, "Live Connection! Close
Connection to Reset!");
        }
    }

    /*
     * connectionsClient_MousePressedEvent method
     * called when user selects client type connection from the connection menu
     * of the menu bar
     */
    private void connectionsClient_MousePressedEvent(java.awt.event.MouseEvent
evt) {
        // TODO add your handling code here:
        // connect only if no live connection
        if (messenger == null) {
            try {
                // get the server ip from user
                ipString = JOptionPane.showInputDialog(rootPane, "Enter Server IP",
"localhost");
                // if user selects cancel then exit by throwing null pointer exception
                if (ipString == null) {
                    throw new NullPointerException();
                }
                // get the serve port id from user
                portIdString = JOptionPane.showInputDialog(rootPane, "Enter Server Port
ID", "3333");
                // if user selects cancel then exit by throwing null pointer exception
                if (portIdString == null) {
                    throw new NullPointerException();
                }
                // assign the Messenger reffernce object with MessengerClient object
                messenger = new MessengerClient();
                // connect the client with the server using server ip and server port id
                messenger.connect(ipString, Integer.parseInt(portIdString));
                updateMessages();
                // notify the user about the successfull connection
                JOptionPane.showMessageDialog(rootPane, "Chat Client connected to
Chat Server with IP: " + ipString + " and Port Id: " + portIdString, "Client Connected",
JOptionPane.INFORMATION_MESSAGE);
                // get the user name to be used while chat
                userName = JOptionPane.showInputDialog(rootPane, "Enter your chat
name", "Client");
                // if cancel pressed then set the default user name
                if (userName == null) {
                    userName = "Client";
                }
                // set the chat startup time - used in chat save
                chatStartUpDateAndTime = Calender.getCurrentDateAndTime();

            } catch (NullPointerException ex) {
                // user cancels the input of ip or port id, do nothing
                nullifyMessengerAndMessages();
            } catch (NumberFormatException ex) {
                nullifyMessengerAndMessages();
                JOptionPane.showMessageDialog(rootPane, "Please Enter a valid Port
Id!", "Port ID Error", JOptionPane.ERROR_MESSAGE);
            } catch (IOException ex) {
                nullifyMessengerAndMessages();
                JOptionPane.showMessageDialog(rootPane, "Could not connect to Server
with IP: " + ipString + " and Port Id: " + portIdString + "\nIO Exception:\n" + ex,
"Connection Error", JOptionPane.ERROR_MESSAGE);
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            } catch (Exception ex) {
                nullifyMessengerAndMessages();
                JOptionPane.showMessageDialog(rootPane, "Could not connect to Server
with IP: " + ipString + " and Port Id: " + portIdString + "\nUnknown Exception:\n" + ex,
"Connection Error", JOptionPane.ERROR_MESSAGE);
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            }
        } else {
            // if currently connected (live connection) then notify user
            JOptionPane.showMessageDialog(rootPane, "Live Connection! Close
Connection to Reset!");
        }
    }

    /*
     * method to nullify the messenger and messages objects
     */
    private void nullifyMessengerAndMessages() {
        // assign messenger to null
        messenger = null;
        // assign all messages to null
        rawMessage = null;
        textMessage = null;
        controlMessage = null;
        // call garbage collector to free the messenger memory
        System.gc();
    }
    /*
     * method to update the messages
     * - the recieved raw  message
     * - the filterd control message
     * - the filterd text message
     */

    private void updateMessages() {
        // create a raw message
        rawMessage = new Message();
        // set the mesenger for the raw message
        rawMessage.setMessenger(messenger);

        // create text message filter for the raw message
        textMessageFilter = new MessageFilter(rawMessage,
FilterTypes.TEXT_FILTER);
        // get the filteredtext message
        textMessage = textMessageFilter.getFilteredMessage();

        // assign the text message to the chat text area
        chatTextArea.setMessage(textMessage);

        // create control message filter for the raw message
        controlMessageFilter = new MessageFilter(rawMessage,
FilterTypes.CONTROL_FILTER);
        // get the filtered message
        controlMessage = controlMessageFilter.getFilteredMessage();

        // assign the control message to the white board
        whiteBoard.setControlMessage(controlMessage);

        // create message reader for the raw message using the messenger
        messageReader = new MessageReader(rawMessage, messenger);
        // start reading the raw message using the reader
        messageReader.startReading();
    }

    /*
     * method called when user selects the close connection menu item from the
connection menu
```

```
     */
    private void
connectionsCloseConnection_MousePressedEvent(java.awt.event.MouseEvent evt)
{
        // TODO add your handling code here:
        try {
            // if messenger is initialised and connection is present then
            if (messenger != null && messenger.isConnected()) {
                // disconnect the connection
                messenger.disconnect();
                // notify the user about the successful disconnection
                JOptionPane.showMessageDialog(rootPane, "Connection Disconnected",
"Connection", JOptionPane.INFORMATION_MESSAGE);
            } else {
                // if messenger is null then it means no connection, so notify the user.
                JOptionPane.showMessageDialog(rootPane, "No Connections Found!",
"Connection", JOptionPane.ERROR_MESSAGE);
            }
        } catch (SocketException ex) {
            JOptionPane.showMessageDialog(rootPane, "Connection Termination
Failed!\nSocket Exception:\n" + ex, "Disconnection Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        } catch (IOException ex) {
            JOptionPane.showMessageDialog(rootPane, "Connection Termination
Failed!\nIO Exception:\n" + ex, "Disconnection Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        } catch (NullPointerException ex) {
            // on null pointer exception do nothing
        } catch (Exception ex) {
            JOptionPane.showMessageDialog(rootPane, "Connection Termination
Failed!\nUnknown Exception:\n" + ex, "Disconnection Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        } finally {
            nullifyMessengerAndMessages();
        }
    }

    /*
     * method called when user selects the about menu from the help menu
     */
    private void helpAbout_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        try {
            // create a property object
            Properties prop = new Properties();
            //load the jlm properties file
            InputStream inputStream =
this.getClass().getClassLoader().getResourceAsStream("com/compnet/jlm/gui/prope
rties/JLM.properties");
            prop.load(inputStream);
            // set the about info from the jlm properties
            String aboutMessage = prop.getProperty("AppName") + "\n\n"
                    + "Developed By: " + prop.getProperty("DevelopedBy") + "\n"
                    + "Email: " + prop.getProperty("DeveloperEmail");
            // show the info about the JLM
            JOptionPane.showMessageDialog(rootPane, aboutMessage, "About",
JOptionPane.INFORMATION_MESSAGE, new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/cha
t_32x32.png")));

        } catch (FileNotFoundException ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load About
Docs!\nFile Not Found Exception:\n" + ex, "Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        } catch (IOException ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load About
Docs!\nIO Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        } catch (Exception ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load About
Docs!\nUnknown Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        }
    }
    /*
     * method called when user selects the help menu from the help menu
     */
    private void helpHelp_MousePressedEvent(java.awt.event.MouseEvent evt) {
        {
            // TODO add your handling code here:
            try {
                // create a property object
                Properties prop = new Properties();
                //load the jlm properties file
                InputStream inputStream =
this.getClass().getClassLoader().getResourceAsStream("com/compnet/jlm/gui/prope
rties/JLM.properties");
                prop.load(inputStream);
                // set the help info from the property
                String helpMessage = prop.getProperty("AppHelp");
                // shoe the help info
                JOptionPane.showMessageDialog(rootPane, helpMessage, "Help",
JOptionPane.INFORMATION_MESSAGE, new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/cha
t_32x32.png")));

            } catch (FileNotFoundException ex) {
                JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load Help
Docs!\nFile Not Found Exception:\n" + ex, "Error",
JOptionPane.ERROR_MESSAGE);
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            } catch (IOException ex) {
                JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load Help
Docs!\nIO Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            } catch (Exception ex) {
                JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load Help
Docs!\nUnknown Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            }
        }
    }

    /*
     * method called when user tries to close the window
     */
    private void windowClosingEvent(java.awt.event.WindowEvent evt) {
        // TODO add your handling code here:
        // exit JLM
        exitJLM();
    }

    /*
     * method called when user presses enter key or send button
     * after entering the message to be sent
     */
    private void sendMessage() {
        // TODO add your handling code here:
        try {
            // call the send message of the messenger reffernce object
            textMessage.sendMessage((char) FilterTypes.TEXT_FILTER + userName +
": " + userInputTextField.getText());
            // add the message to the user's chat window
            frameTextArea.append("\n" + userName + ": " +
userInputTextField.getText());
        } catch (NullPointerException ex) {
            JOptionPane.showMessageDialog(rootPane, "Could not Send Message!\nNo
Connection!", "Send Error", JOptionPane.ERROR_MESSAGE);
        } catch (Exception ex) {
            JOptionPane.showMessageDialog(rootPane, "Could not Send
Message!\nUnknown Exception:\n" + ex, "Send Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        } finally {
            // finally clear the chat text input field
            userInputTextField.setText("");
        }
    }

    /*
     * method called when user presses the send button
     */
    private void inputSend_MousePressedEvent(java.awt.event.MouseEvent evt) {
        sendMessage();
    }

    /*
     * method called when user types into the char input field
     */
    private void inputTextField_KeyTypedEvent(java.awt.event.KeyEvent evt) {
        // TODO add your handling code here:
        // if user presses enter key then send the message
        if (evt.getKeyChar() == KeyEvent.VK_ENTER) {
            // calling send message method
            sendMessage();
        }
    }

    /*
     * method called when user selects the show board menu
     */
    private void
showBoardMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // set the white board visible
        whiteBoard.setVisible(true);
    }

    /*
     * method called when user selects the save chat menu from file menu
     */
    private void saveChatMenuItem_MousePressedEvent(java.awt.event.MouseEvent
evt) {
        // TODO add your handling code here:
        // create a file chooser
        JFileChooser jfc = new JFileChooser();
        // get the selection result
        int r = jfc.showSaveDialog(jfc);
        // on approve selection
        if (r == JFileChooser.APPROVE_OPTION) {
            // create file output stream object
            FileOutputStream fout = null;
            try {
                // get the selected file
                File f = jfc.getSelectedFile();
                // create file output stream for the file
                fout = new FileOutputStream(f);
                // create the chat log header
                String chatLog = "******* JLM Chat Log *******\n"
                        // set the program startup time
                        + "Chat Started: " + chatStartUpDateAndTime + "\n"
                        // set the chat save time
                        + "Chat Saved: " + Calender.getCurrentDateAndTime() + "\n"
                        // set the connection type
                        + "Connected As: " + ((messenger instanceof MessengerClient) ?
"Client" : "Server") + "\n"
                        // if connected as client then set the ip address
                        + (messenger instanceof MessengerClient ? ("IP: " + ipString + "\n") :
"")
                        // set the port id
                        + "Port Id: " + portIdString + "\n"
                        // set the user name
                        + "User Name: " + userName + "\n"
                        + "******* Chat Message *******\n"
                        // set the chat message
                        + chatTextArea.getText();
                // write the created log onto the file
                fout.write(chatLog.getBytes());
                // flush the stream
                fout.flush();
            } catch (IOException ex) {
                Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
            } finally {
                try {
                    // finally close the stream
                    fout.close();
                    JOptionPane.showMessageDialog(rootPane, "Chat Saved.");
                } catch (IOException ex) {
                    Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null,
ex);
                }
            }
        }
    }

    /*
     * method called when user selects the my ip menu from the help menu
     */
    private void myIPMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt)
{
        // TODO add your handling code here:
        try {
            // get the host ip and name and display it
            InetAddress host = InetAddress.getLocalHost();
            JOptionPane.showMessageDialog(
                    rootPane,
                    "Your IP: " + host.getHostAddress()
                    + "\nHost Name: " + host.getHostName(),
                    "MyIP",
                    JOptionPane.INFORMATION_MESSAGE,
                    new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/gui/resources/cha
t_32x32.png")));
        } catch (UnknownHostException ex) {
            Logger.getLogger(JLMFrame.class.getName()).log(Level.SEVERE, null, ex);
        }
    }

    /**
     * @param args the command line arguments
     */
    public static void main(String args[]) {
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new JLMFrame().setVisible(true);
            }
        });
    }
    // Variables declaration - do not modify
    private javax.swing.JMenuItem aboutMenuItem;
    private javax.swing.JPanel chatPanel;
    private javax.swing.JMenuItem clientMenuItem;
    private javax.swing.JMenuItem closeConnectionMenuItem;
    private javax.swing.JMenu connectionsMenu;
    private javax.swing.JMenuItem exitMenuItem;
    private javax.swing.JMenu fileMenu;
    private javax.swing.JTextArea frameTextArea;
    private javax.swing.JMenu helpMenu;
    private javax.swing.JMenuItem helpMenuItem;
    private javax.swing.JScrollPane jScrollPane1;
    private javax.swing.JMenuBar menuBar;
    private javax.swing.JMenuItem myIpMenuItem;
    private javax.swing.JMenuItem saveChatMenuItem;
    private javax.swing.JMenuItem serverMenuItem;
    private javax.swing.JMenuItem showBoardMenuItem;
    private javax.swing.JPanel userInputPanel;
    private javax.swing.JButton userInputSendButton;
    private javax.swing.JTextField userInputTextField;
    private javax.swing.JMenu whiteBoardMenu;
    // End of variables declaration
}
```

ChatTextArea.java

```
package com.compnet.jlm.gui.components;

import com.compnet.jlm.core.message.Message;
import java.beans.PropertyChangeEvent;
import java.beans.PropertyChangeListener;
import javax.swing.JTextArea;
import javax.swing.text.DefaultCaret;

/**
 *
 * @author Nikesh
 */
/*
 * ChatTextArea.java
 *
 * this class provides the chat text area implimentation to display the chat messages
 */
public class ChatTextArea extends JTextArea implements PropertyChangeListener {

    // message object
    private Message message = null;

    // getter for message object
    public Message getMessage() {
        return message;
    }

    // setter for message object
    public void setMessage(Message message) {
        // set the reference message
        this.message = message;
        // add the chat text area as alistner to the message object
        // listining to message text change
        this.message.addPropertyChangeListener(this);
    }

    /*
     * method called on message text change to append the text message
     * to the chat text area
     */
    public void propertyChange(PropertyChangeEvent evt) {
        this.append("\n" + this.message.getMessage());
    }

    /*
     * constructo fo the ChatTextArea class
     */
    public ChatTextArea() {
        // call super class default constructor
        super();
        // set auto scroll to the chat text area
        // so as to always display the last added message
        DefaultCaret caret = (DefaultCaret) this.getCaret();
        caret.setUpdatePolicy(DefaultCaret.ALWAYS_UPDATE);
    }
}
```

JLMProperties

```
AppName = Java LAN Messenger
DevelopedBy = Team NGHS
DeveloperEmail = aboutus@gmail.com
AppHelp =\
- If you are initiating the chat then select Server mode.\n\
- If you want to join a Server select Client mode.\n\
- In Server mode you have to provide the Port Id.\n\
- You can see your IP address from the MyIP menu.\n\
- A default Port Id has been already provided.\n\
- In Client mode you have to enter the Server Ip and Server Port Id.\n\
- Use the input text field to enter your chat message.\n\
- Select the white board from the white board menu.\n\
- Save your chat using the save chat option from the file menu.\n\
- Before exiting the application close the connection.
```

Main.java

```
package com.compnet.jlm.main;
```

```
import com.compnet.jlm.gui.JLMFrame;
import com.compnet.jlm.whiteboard.gui.WhiteBoardFrame;

/**
 *
 * @author Nikesh
 */
public class Main {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {
        // TODO code application logic here
        /* Set the Nimbus look and feel */
        //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code
(optional) ">
        /* If Nimbus (introduced in Java SE 6) is not available, stay with the default look
and feel.
         * For details see
http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html
         */
        try {
            for (javax.swing.UIManager.LookAndFeelInfo info :
javax.swing.UIManager.getInstalledLookAndFeels()) {
                if ("Nimbus".equals(info.getName())) {
                    javax.swing.UIManager.setLookAndFeel(info.getClassName());
                    break;
                }
            }
        } catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        } catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        } catch (IllegalAccessException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        } catch (javax.swing.UnsupportedLookAndFeelException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        }
        //</editor-fold>
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                // creating the main window frame for the application
                // and setting its visibility to true
                new JLMFrame().setVisible(true);
            }
        });
    }
}
```

Calendar.java

```
package com.compnet.jlm.utils;

import java.text.DateFormat;
import java.text.SimpleDateFormat;
import java.util.Calendar;

/**
 *
 * @author Nikesh
 */
/*
 * Calender.java
 *
 * this class provides a static method to get the current date and time
 */
public class Calender {

    public static String getCurrentDateAndTime() {
        // set the date format
        DateFormat dateFormat = new SimpleDateFormat("yyyy/MM/dd HH:mm:ss");
        // get calender instance
        Calendar cal = Calendar.getInstance();
        // return the formated date and time
        return dateFormat.format(cal.getTime());
    }
}
```

WhiteBoardInterface.java

```
package com.compnet.jlm.whiteboard.core;

import java.awt.Color;
import java.awt.image.BufferedImage;
```

```
/**
 *
 * @author Nikesh
 */

/*
 * this interface provides the methods that must be implimented for the whiteboard
 */
public interface WhiteBoardInterface {

    /*
     * method to draw onto the white board at location (x,y)
     */
    public void drawOntoBoard(int x, int y);

    /*
     * method to resize the board
     */
    public void resizeBoard(int width, int height);

    /*
     * method to clear the contents of the board
     */
    public void clearBoard();

    /*
     * method to set an image onto the board
     */
    public void setBoardImage(BufferedImage boardImage);

    /*
     * method to set the chalk color
     */
    public void setChalkColor(Color chalkColor);

    /*
     * method to set the chalk size
     */
    public void setChalkSize(int chalkSize);

    /*
     * method to set the board color
     */
    public void setBoardColor(Color boardColor);
}
```

WhiteBoardPaner.java

```
package com.compnet.jlm.whiteboard.core.boardpanel;

import com.compnet.jlm.whiteboard.core.WhiteBoardInterface;
import java.awt.Color;
import java.awt.Cursor;
import java.awt.Graphics;
import java.awt.Image;
import java.awt.Point;
import java.awt.Toolkit;
import java.awt.image.BufferedImage;
import java.io.IOException;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.imageio.ImageIO;

/**
 *
 * @author Nikesh
 */

/*
 * this class is theimplimentation of the white board interface using a jpanel
 */
public class WhiteBoardPanel extends javax.swing.JPanel implements
WhiteBoardInterface {

    // the board image object onto which all drawings are made
    private BufferedImage boardImage = null;
    // temporary board image for board color change operations
    private BufferedImage tempImage = null;
    // graphics object for the board image
    private Graphics boardImageGraphics = null;
    // chalk color
    private Color chalkColor = null;
    // board color
    private Color boardColor = null;
    // chalk size
    private int chalkSize = 0;

    /**
     * Creates new form WhiteBoardPanel
     */
    public WhiteBoardPanel() {
        initComponents();
        // set the custom cursor for the white board panel
        setCursorIcon();
        // set default chalk color, board color and chalk size
        chalkColor = Color.BLACK;
        boardColor = Color.WHITE;
        chalkSize = 10;
    }

    /*
     * the overridden paint method of the jpanel
     */
    @Override
    public void paint(Graphics g) {
        // set the board color
        g.setColor(boardColor);
        // clear the whole panel by filling it with the borad color
        g.fillRect(0, 0, this.getWidth(), this.getHeight());
        // draw the user drawn image onto the panel
        g.drawImage(boardImage, 0, 0, this);
    }

    /**
     * This method is called from within the constructor to initialize the form.
     * WARNING: Do NOT modify this code. The content of this method is always
     * regenerated by the Form Editor.
     */
    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
    private void initComponents() {

        javax.swing.GroupLayout layout = new javax.swing.GroupLayout(this);
        this.setLayout(layout);
        layout.setHorizontalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGap(0, 400, Short.MAX_VALUE)
        );
        layout.setVerticalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGap(0, 300, Short.MAX_VALUE)
        );
    }// </editor-fold>

    /*
     * white board interface method implimentation
     * for drawing onto the panel (board)
     */
    @Override
    public void drawOntoBoard(int x, int y) {
        // pencil shape is circular so use fill oval
```

```
        // drawing at location (x,y) with the chalk size
        boardImageGraphics.fillOval(x - (chalkSize / 2), y - (chalkSize / 2), chalkSize,
chalkSize);
        // repaint the panel
        this.repaint();
    }

    /*
     * white board interface method implimentation
     * for resizing the board
     */
    @Override
    public void resizeBoard(int width, int height) {
        // resize only if board image is present
        // and the new resolution is greater than the previous one
        // this is done so as to prevent image clipping on panel resize by the user
        // as if clipping is done then what ever the other person draws the current user
wouldn't see
        if ((boardImage == null) || ((width >= boardImage.getWidth()) && (height >=
boardImage.getHeight()))) {
            // save the curent board image to the temporary image
            tempImage = boardImage;
            // create a new image with new resolution and assign it to the board image
            boardImage = new BufferedImage(width, height,
BufferedImage.TYPE_4BYTE_ABGR_PRE);
            // get the graphics object for the new image
            boardImageGraphics = boardImage.getGraphics();
            // set the chalk color for the new graphics object
            boardImageGraphics.setColor(chalkColor);
            // if there is a valid temp image then
            if (tempImage != null) {
                // draw that image onto the new board image
                boardImageGraphics.drawImage(tempImage, 0, 0, this);
            }
            // repaint the panel
            this.repaint();
        }
    }

    // Variables declaration - do not modify
    // End of variables declaration
    /*
     * method to set the custom cursor icon for the board panel
     */
    private void setCursorIcon() {
        try {
            //Get the default toolkit
            Toolkit toolkit = Toolkit.getDefaultToolkit();
            //Load an image for the cursor
            Image image =
ImageIO.read(getClass().getResource("/com/compnet/jlm/whiteboard/core/resources
/chalk.png"));
            //Create the hotspot for the cursor
            Point hotSpot = new Point(0, 0);
            //Create the custom cursor
            Cursor cursor = toolkit.createCustomCursor(image, hotSpot, "Chalk");
            //Use the custom cursor
            setCursor(cursor);
        } catch (IOException ex) {
            Logger.getLogger(WhiteBoardPanel.class.getName()).log(Level.SEVERE,
null, ex);
        }
    }

    /*
     * white board interface method implimentation
     * for clearing the contents of the board
     */
    @Override
    public void clearBoard() {
        // assign new image with the same resolution to the board image object
        boardImage = new BufferedImage(boardImage.getWidth(),
boardImage.getHeight(), BufferedImage.TYPE_INT_ARGB_PRE);
        // get the graphics object for the new image
        boardImageGraphics = boardImage.getGraphics();
        // set the current chalk color for the graphics object
        boardImageGraphics.setColor(chalkColor);
        // repaint the panel
        this.repaint();
    }

    /*
     * GETTER AND SETTER for local variables
     */
    public BufferedImage getBoardImage() {
        // here the refernce to the original image is not returned
        // insted a new copy of the board image is made and returned
        BufferedImage newBoardImage = new BufferedImage(boardImage.getWidth(),
boardImage.getHeight(), BufferedImage.TYPE_INT_ARGB_PRE);
        Graphics newBoardImageGraphics = newBoardImage.getGraphics();
        newBoardImageGraphics.setColor(boardColor);
        newBoardImageGraphics.fillRect(0, 0, newBoardImage.getWidth(),
newBoardImage.getHeight());
        newBoardImageGraphics.drawImage(boardImage, 0, 0, this);
        return newBoardImage;
    }
    @Override
    public void setBoardImage(BufferedImage boardImage) {
        this.boardImageGraphics.drawImage(boardImage, 0, 0, this);
        this.repaint();
    }

    public Graphics getBoardImageGraphics() {
        return boardImageGraphics;
    }

    public void setBoardImageGraphics(Graphics boardImageGraphics) {
        this.boardImageGraphics = boardImageGraphics;
    }

    public Color getChalkColor() {
        return chalkColor;
    }

    @Override
    public void setChalkColor(Color chalkColor) {
        this.chalkColor = chalkColor;
        this.boardImageGraphics.setColor(this.chalkColor);
    }

    public int getChalkSize() {
        return chalkSize;
    }

    @Override
    public void setChalkSize(int chalkSize) {
        this.chalkSize = chalkSize;
    }

    public Color getBoardColor() {
        return boardColor;
    }

    @Override
    public void setBoardColor(Color boardColor) {
        this.boardColor = boardColor;
        this.repaint();
    }
}
```

CommandType.java

```
package com.compnet.jlm.whiteboard.core.controller;

/**
 *
 * @author Nikesh
 */
/*
 * this final class provides the constants for the command message types.
 * for every method defined in the white board interface, there is a command type
 */
public final class CommandType {

    public static final int DRAW_ONTO_BOARD = 30000;
    public static final int RESIZE_BOARD = 30001;
    public static final int CLEAR_BOARD = 30002;
    public static final int SET_BOARD_IMAGE = 30003;
    public static final int SET_CHALK_COLOR = 30004;
    public static final int SET_CHALK_SIZE = 30005;
    public static final int SET_BOARD_COLOR = 30006;
}
```

CurrentBoardController.java

```
package com.compnet.jlm.whiteboard.core.controller;

import com.compnet.jlm.core.message.Message;
import com.compnet.jlm.whiteboard.core.boardpanel.WhiteBoardPanel;
import java.awt.Color;
import java.beans.PropertyChangeEvent;
import java.beans.PropertyChangeListener;

/**
 *
 * @author Nikesh
 */

/*
 * this class provides method to control(draw and manipulate) the current
 * white board, according to the recieved control commad
 */
public class CurrentBoardController implements PropertyChangeListener {

    // the white board panel reffernce object
    private WhiteBoardPanel whiteBoardPanel = null;
    // the recieved control message reffernce object
    private Message recievedMessage = null;
    // the message string
    private String messageString = null;
    // the recieved command type
    private int commandType = 0;
    // current and remote chalk size and color
    private int remoteChalkSize = 0;
    private Color remoteChalkColor = null;
    private int currentChalkSize = 0;
    private Color currentChalkColor = null;

    /*
     * privatising the default constructor there by preventing usage
     */
    private CurrentBoardController() {
    }

    /*
     * constructor with the white board panel and control message references as
     * arguments
     */
    public CurrentBoardController(WhiteBoardPanel whiteBoardPanel, Message
recievedMessage) {
        // set the white board panel refernce
        this.whiteBoardPanel = whiteBoardPanel;
        // set the recieved control message refernce
        this.recievedMessage = recievedMessage;
        // set the current class as a listner for the recieved message
        this.recievedMessage.addPropertyChangeListener(this);
        // initilise the current and remote chalk size and color
        // with the white board defaults
        currentChalkColor = whiteBoardPanel.getChalkColor();
        remoteChalkColor = whiteBoardPanel.getChalkColor();
        currentChalkSize = whiteBoardPanel.getChalkSize();
        remoteChalkSize = whiteBoardPanel.getChalkSize();
    }

    /*
     * property change event listner method
     */
    public void propertyChange(PropertyChangeEvent evt) {
        // when ever the recieved message changes
        //then process the recieved command message
        processRecievedCommand();
    }

    /*
     * method to process the recieved command message
     */
    private void processRecievedCommand() {
        // get the command string
        messageString = recievedMessage.getMessage();
        // get the command type which is the first char in the message string
        commandType = messageString.charAt(0);
        switch (commandType) {
            // if clear command
            case CommandType.CLEAR_BOARD: {
                // clear the white board
                whiteBoardPanel.clearBoard();
            }
            break;
            // if draw command
            case CommandType.DRAW_ONTO_BOARD: {
                // get the current current chalk color and size
                currentChalkColor = whiteBoardPanel.getChalkColor();
                currentChalkSize = whiteBoardPanel.getChalkSize();
                // set the remote chalk color and size to the current white board panel
                whiteBoardPanel.setChalkColor(remoteChalkColor);
                whiteBoardPanel.setChalkSize(remoteChalkSize);
                // draw at the specified location
                // the x and y coordiantes are present at the next two locations of the
message string
                whiteBoardPanel.drawOntoBoard(messageString.charAt(1),
messageString.charAt(2));
                // reset the white board panel's chalk color and size
                // with the current current chalk color and size
                whiteBoardPanel.setChalkColor(currentChalkColor);
                whiteBoardPanel.setChalkSize(currentChalkSize);
            }
            break;
            // if resize command
            case CommandType.RESIZE_BOARD: {
                // resize the board panel to the specified resolution
                // the width and height are present at the next two locations of the
message string
                whiteBoardPanel.resizeBoard(messageString.charAt(1),
messageString.charAt(2));
            }
            break;
            // if set board color command
            case CommandType.SET_BOARD_COLOR: {
                // set board color
                whiteBoardPanel.setBoardColor(new Color(messageString.charAt(1),
messageString.charAt(2), messageString.charAt(3)));
            }
            break;
            //if set board image command
            case CommandType.SET_BOARD_IMAGE: {
                // ############# NOT YET IMPLIMENTED ###############
            }
            break;
            // if set chalk color command
            case CommandType.SET_CHALK_COLOR: {
                // set remote chalk color
                remoteChalkColor = new Color(messageString.charAt(1),
messageString.charAt(2), messageString.charAt(3));
            }
            break;
            // if set chalk size command
            case CommandType.SET_CHALK_SIZE: {
                try {
                    // set the remote chalk size
                    remoteChalkSize = messageString.charAt(1);
                } catch (StringIndexOutOfBoundsException ex) {
                    // try catch to skip runtime error ...
                }
            }
            break;
        }
    }

    /*
     * getter and setter for white board panel, control message
     */
    public WhiteBoardPanel getWhiteBoardPanel() {
        return whiteBoardPanel;
    }

    public void setWhiteBoardPanel(WhiteBoardPanel whiteBoardPanel) {
        this.whiteBoardPanel = whiteBoardPanel;
    }

    public Message getControlMessage() {
        return recievedMessage;
    }

    public void setControlMessage(Message controlMessage) {
        this.recievedMessage = controlMessage;
    }
}
```

RemoteBoardController.java

```
package com.compnet.jlm.whiteboard.core.controller;

import com.compnet.jlm.core.message.Message;
import com.compnet.jlm.core.message.filters.FilterTypes;
import com.compnet.jlm.whiteboard.core.WhiteBoardInterface;
import java.awt.Color;
import java.awt.image.BufferedImage;

/**
 *
 * @author Nikesh
 */

/*
 * this class provides methods for sending control commands to the
 * remote white board.
 */
public class RemoteBoardController implements WhiteBoardInterface {

   // the control message object
   private Message controlMessage = null;

   /*
    * constructo with control message object as argument
    */
   public RemoteBoardController(Message message) {
      this.controlMessage = message;
   }

   /*
    * method to send draw command
    */
   public void drawOntoBoard(int x, int y) {
      controlMessage.sendMessage(""
            + (char) FilterTypes.CONTROL_FILTER
            + (char) CommandType.DRAW_ONTO_BOARD
            + (char) x
            + (char) y);
   }

   /*
    * method to send resize board command
    */
   public void resizeBoard(int width, int height) {
      controlMessage.sendMessage(""
            + (char) FilterTypes.CONTROL_FILTER
            + (char) CommandType.RESIZE_BOARD
            + (char) width
            + (char) height);
   }

   /*
    * method to send clear board command
    */
   public void clearBoard() {
      controlMessage.sendMessage(""
            + (char) FilterTypes.CONTROL_FILTER
            + (char) CommandType.CLEAR_BOARD);
   }

   /*
    * method to send board image command ####### NOT YET IMPLIMENTED
######
    */
   public void setBoardImage(BufferedImage boardImage) {
      /*int[] rgbArray = new int[boardImage.getWidth()*boardImage.getHeight()];
       boardImage.getRGB(0, 0, boardImage.getWidth(), boardImage.getHeight(),
rgbArray, 0, boardImage.getWidth());

       controlMessage.sendMessage(""
       + (char) FilterTypes.CONTROL_FILTER
       + (char) CommandType.SET_BOARD_IMAGE
       + boardImage.);*/
   }

   /*
    * method to send set chalk color command
    */
   public void setChalkColor(Color chalkColor) {
      controlMessage.sendMessage(""
            + (char) FilterTypes.CONTROL_FILTER
            + (char) CommandType.SET_CHALK_COLOR
            + (char) chalkColor.getRed()
            + (char) chalkColor.getGreen()
            + (char) chalkColor.getBlue());
   }

   /*
    * method to send set chalk size command
    */
   public void setChalkSize(int chalkSize) {
      controlMessage.sendMessage(""
            + (char) FilterTypes.CONTROL_FILTER
            + (char) CommandType.SET_CHALK_SIZE
            + (char) chalkSize);
    }

    /*
     * method to send set board color command
     */
    public void setBoardColor(Color boardColor) {
        controlMessage.sendMessage(""
                + (char) FilterTypes.CONTROL_FILTER
                + (char) CommandType.SET_BOARD_COLOR
                + (char) boardColor.getRed()
                + (char) boardColor.getGreen()
                + (char) boardColor.getBlue());
    }

    // getter and setter for control message
    public Message getControlMessage() {
        return controlMessage;
    }

    public void setControlMessage(Message controlMessage) {
        this.controlMessage = controlMessage;
    }
}
```

WhiteBoardFrame.java

```
package com.compnet.jlm.whiteboard.gui;

import com.compnet.jlm.core.message.Message;
import com.compnet.jlm.whiteboard.core.boardpanel.WhiteBoardPanel;
import com.compnet.jlm.whiteboard.core.controller.CurrentBoardController;
import com.compnet.jlm.whiteboard.core.controller.RemoteBoardController;
import com.compnet.jlm.whiteboard.utils.ContrastColor;
import java.awt.Color;
import java.io.File;
import java.io.FileInputStream;
import java.io.FileNotFoundException;
import java.io.IOException;
import java.io.InputStream;
import java.util.Properties;
import java.util.logging.Level;
import java.util.logging.Logger;
import javax.imageio.ImageIO;
import javax.swing.JColorChooser;
import javax.swing.JFileChooser;
import javax.swing.JOptionPane;
```

```
/**
 *
 * @author Nikesh
 */

/*
 * this class provides the frame for the white board panel and implements
 * the user interface.
 */
public class WhiteBoardFrame extends javax.swing.JFrame {

   // the white board panel object
   private WhiteBoardPanel whiteBoardPanel = null;
   // the current board controller object to control the host white board panel
   private CurrentBoardController currentBoardController = null;
   // the remote board controller object to controll the remote white board panel
   private RemoteBoardController remoteBoardController = null;
   // control message object
   private Message controlMessage = null;
   // file object used while saving the drawn image
   private File file = null;
   // chalk and board color object
   private Color chalkColor = null;
   private Color boardColor = null;
   // the chalk size variable
   private int chalkSize = 0;

   /**
    * Creates new form WhiteBoardFrame
    */
   public WhiteBoardFrame() {
      // initialise the white board panel
      // as it is being refernce by the frame panel from within the generated code
      whiteBoardPanel = new WhiteBoardPanel();
      // initilise the components
      initComponents();
      // set the frame icon
      try {

this.setIconImage(ImageIO.read(getClass().getResource("/com/compnet/jlm/whitebo
ard/gui/resources/whiteBoardIcon_16x16.png")));
      } catch (IOException ex) {
         Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
      }
      // update the control panel button attribute
      updateControlPanelButtonAttributes();
```

```
        /* ------------------------------------------------------------------
         * THE SET IMAGE FUNCTION FOR THE WHITE BOARD IS NOT YET
IMPLIMENTED
         * HENCE THE OPEN MENU ITEM IN THE FILE MENU IS DISSABLED FOR
NOW
         * ------------------------------------------------------------------
         */
        openMenuItem.setVisible(false);
        openMenuItem.setEnabled(false);
    }

    /*
     * method to update the control panel button attributes
     */
    private void updateControlPanelButtonAttributes() {
        // set the chalk color selection button background color to the selected chalk
color
        chalkColorButton.setBackground(whiteBoardPanel.getChalkColor());
        // set the chalk color selection button foreground color to the contrast of the
selected chalk color

chalkColorButton.setForeground(ContrastColor.getContrastColor(whiteBoardPanel.g
etChalkColor()));
        // set the board color selection button background color to the selected board
color
        boardColorButton.setBackground(whiteBoardPanel.getBoardColor());
        // set the board color selection button foreground color to the contrast of the
selected board color

boardColorButton.setForeground(ContrastColor.getContrastColor(whiteBoardPanel.g
etBoardColor()));
    }

    /**
     * This method is called from within the constructor to initialize the form.
     * WARNING: Do NOT modify this code. The content of this method is always
     * regenerated by the Form Editor.
     */
    @SuppressWarnings("unchecked")
    // <editor-fold defaultstate="collapsed" desc="Generated Code">
    private void initComponents() {

        framePanel = whiteBoardPanel;
        controlPanel = new javax.swing.JPanel();
        chalkColorButton = new javax.swing.JButton();
        boardColorButton = new javax.swing.JButton();
        chalkSizeSpinner = new javax.swing.JSpinner();
        menuBar = new javax.swing.JMenuBar();
        fileMenu = new javax.swing.JMenu();
        newMenuItem = new javax.swing.JMenuItem();
        openMenuItem = new javax.swing.JMenuItem();
        saveMenuItem = new javax.swing.JMenuItem();
        saveAsMenuItem = new javax.swing.JMenuItem();
        exitMenuItem = new javax.swing.JMenuItem();
        editMenu = new javax.swing.JMenu();
        clearBoardMenuItem = new javax.swing.JMenuItem();
        helpMenu = new javax.swing.JMenu();
        aboutMenuItem = new javax.swing.JMenuItem();
        helpMenuItem = new javax.swing.JMenuItem();

        setTitle("WhiteBoard v0.1");

        framePanel.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                framePanel_MousePressedEvent(evt);
            }
        });
        framePanel.addComponentListener(new java.awt.event.ComponentAdapter() {
            public void componentResized(java.awt.event.ComponentEvent evt) {
                framePanel_ComponentREsizedEvent(evt);
            }
        });
        framePanel.addMouseMotionListener(new
java.awt.event.MouseMotionAdapter() {
            public void mouseDragged(java.awt.event.MouseEvent evt) {
                framePanel_MouseDraggedEvent(evt);
            }
        });

        javax.swing.GroupLayout framePanelLayout = new
javax.swing.GroupLayout(framePanel);
        framePanel.setLayout(framePanelLayout);
        framePanelLayout.setHorizontalGroup(

framePanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADIN
G)
            .addGap(0, 356, Short.MAX_VALUE)
        );
        framePanelLayout.setVerticalGroup(

framePanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADIN
G)
            .addGap(0, 0, Short.MAX_VALUE)
        );
```

```
controlPanel.setBorder(javax.swing.BorderFactory.createTitledBorder("Controls"));

        chalkColorButton.setText("Chalk Color");
        chalkColorButton.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                controls_chalkColorButton_MousePressedEvent(evt);
            }
        });

        boardColorButton.setText("Board Color");
        boardColorButton.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                controls_boardColorButton__MousePressedEvent(evt);
            }
        });

        chalkSizeSpinner.setModel(new javax.swing.SpinnerNumberModel(10, 2, 100,
1));

chalkSizeSpinner.setBorder(javax.swing.BorderFactory.createTitledBorder("Chalk
Size"));
        chalkSizeSpinner.addChangeListener(new javax.swing.event.ChangeListener()
{
            public void stateChanged(javax.swing.event.ChangeEvent evt) {
                controls_chalkSizeSpinner_StateChangedEvent(evt);
            }
        });

        javax.swing.GroupLayout controlPanelLayout = new
javax.swing.GroupLayout(controlPanel);
        controlPanel.setLayout(controlPanelLayout);
        controlPanelLayout.setHorizontalGroup(

controlPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADI
NG)
            .addComponent(chalkColorButton)
            .addComponent(chalkSizeSpinner,
javax.swing.GroupLayout.PREFERRED_SIZE, 94,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addComponent(boardColorButton)
        );

        controlPanelLayout.linkSize(javax.swing.SwingConstants.HORIZONTAL, new
java.awt.Component[] {boardColorButton, chalkColorButton, chalkSizeSpinner});

        controlPanelLayout.setVerticalGroup(
controlPanelLayout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADI
NG)
         .addGroup(controlPanelLayout.createSequentialGroup()
            .addComponent(chalkColorButton)
            .addGap(18, 18, 18)
            .addComponent(chalkSizeSpinner,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addGap(18, 18, 18)
            .addComponent(boardColorButton)
            .addContainerGap(85, Short.MAX_VALUE))
      );

      fileMenu.setText("File");

      newMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/new.png"))); // NOI18N
      newMenuItem.setText("New");
      newMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
         public void mousePressed(java.awt.event.MouseEvent evt) {
            newMenuItem_MousePressedEvent(evt);
         }
      });
      fileMenu.add(newMenuItem);

      openMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/open.png"))); // NOI18N
      openMenuItem.setText("Open");
      openMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
         public void mousePressed(java.awt.event.MouseEvent evt) {
            openMenuItem_MousePressedEvent(evt);
         }
      });
      fileMenu.add(openMenuItem);

      saveMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/save.png"))); // NOI18N
      saveMenuItem.setText("Save");
      saveMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
         public void mousePressed(java.awt.event.MouseEvent evt) {
            saveMenuItem_MousePressedEvent(evt);
         }
      });
      fileMenu.add(saveMenuItem);
```

```
        saveAsMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/saveAs.png"))); // NOI18N
        saveAsMenuItem.setText("Save As");
        saveAsMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                saveAsMenuItem_MousePressedEvent(evt);
            }
        });
        fileMenu.add(saveAsMenuItem);

        exitMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/exit.png"))); // NOI18N
        exitMenuItem.setText("Exit");
        exitMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                exitMenuItem_MousePressedEvent(evt);
            }
        });
        fileMenu.add(exitMenuItem);

        menuBar.add(fileMenu);

        editMenu.setText("Edit");

        clearBoardMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/clear.png"))); // NOI18N
        clearBoardMenuItem.setText("Clear Board");
        clearBoardMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
                clearBoardMenuItem_MousePressedEvent(evt);
            }
        });
        editMenu.add(clearBoardMenuItem);

        menuBar.add(editMenu);

        helpMenu.setText("Help");

        aboutMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/about.png"))); // NOI18N
        aboutMenuItem.setText("About");
        aboutMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
            public void mousePressed(java.awt.event.MouseEvent evt) {
```

```
            aboutMenuItem_MousePressedEvent(evt);
        }
    });
    helpMenu.add(aboutMenuItem);

    helpMenuItem.setIcon(new
javax.swing.ImageIcon(getClass().getResource("/com/deepak/jlm/whiteboard/gui/res
ources/help.png"))); // NOI18N
    helpMenuItem.setText("Help");
    helpMenuItem.addMouseListener(new java.awt.event.MouseAdapter() {
        public void mousePressed(java.awt.event.MouseEvent evt) {
            helpMenuItem_MousePressedEvent(evt);
        }
    });
    helpMenu.add(helpMenuItem);

    menuBar.add(helpMenu);

    setJMenuBar(menuBar);

    javax.swing.GroupLayout layout = new
javax.swing.GroupLayout(getContentPane());
    getContentPane().setLayout(layout);
    layout.setHorizontalGroup(
        layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addGroup(layout.createSequentialGroup()
            .addContainerGap()
            .addComponent(framePanel, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
            .addGap(18, 18, 18)
            .addComponent(controlPanel,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addContainerGap())
    );
    layout.setVerticalGroup(
        layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addGroup(layout.createSequentialGroup()
            .addContainerGap()

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADIN
G)
                .addGroup(layout.createSequentialGroup()
                    .addComponent(controlPanel,
javax.swing.GroupLayout.PREFERRED_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```
                    .addGap(0, 0, Short.MAX_VALUE))
                .addComponent(framePanel,
javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
            .addContainerGap())
        );

        pack();
    }// </editor-fold>

    /*
     * method called when new menu item is selected
     */
    private void newMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt)
{
        // TODO add your handling code here:
        // set file refernce to null
        file = null;
        // clear the board
        whiteBoardPanel.clearBoard();
        // if remote board controller is present then send clear command
        if (remoteBoardController != null) {
            remoteBoardController.clearBoard();
        }
    }

    /*
     * method called when open menu item is pressed
     */
    private void openMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt)
{
        // TODO add your handling code here:
        // create a file chooser object
        JFileChooser jfc = new JFileChooser();
        // get selection result
        int selection = jfc.showOpenDialog(jfc);
        // if selection is of type approve
        if (selection == JFileChooser.APPROVE_OPTION) {
            //get the selected file
            file = jfc.getSelectedFile();
            try {
                // set the current white board panel image from the selected file
                whiteBoardPanel.setBoardImage(ImageIO.read(file));
                // if remote board controller is present then send command to set the
remote board image
                if (remoteBoardController != null) {
                    remoteBoardController.setBoardImage(ImageIO.read(file));
                }
            } catch (IOException ex) {
                Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
            }
        }
    }

    /*
     * method called when save menu item is selected
     */
    private void saveMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt)
{
        // TODO add your handling code here:
        // if no previous files saved then
        if (file == null) {
            // create a file chooser
            JFileChooser jfc = new JFileChooser();
            // get selection type
            int selection = jfc.showSaveDialog(jfc);
            // on approve selection
            if (selection == JFileChooser.APPROVE_OPTION) {
                // get the selected file
                file = jfc.getSelectedFile();
            }
        }
        // if a previous copy of the image is already saved to a file then
        if (file != null) {
            try {
                // write the image onto that file
                ImageIO.write(whiteBoardPanel.getBoardImage(), "PNG", file);
            } catch (IOException ex) {
                Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
            }
        }
    }

    /*
     * method called when save as menu item mouse pressed
     */
    private void saveAsMenuItem_MousePressedEvent(java.awt.event.MouseEvent
evt) {
        // TODO add your handling code here:
        // create a file chooser
        JFileChooser jfc = new JFileChooser();
        // get selection result
        int selection = jfc.showSaveDialog(jfc);
        // if type is approve type
        if (selection == JFileChooser.APPROVE_OPTION) {
            // get selected file
            file = jfc.getSelectedFile();
            try {
                // save the board image onto the file
                ImageIO.write(whiteBoardPanel.getBoardImage(), "PNG", file);
            } catch (IOException ex) {
                Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
            }
        }
    }

    /*
     * method called whenclear board menu item mouse pressed
     */
    private void
clearBoardMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // clear the current white board panel
        whiteBoardPanel.clearBoard();
        // if remote board controller present then
        if (remoteBoardController != null) {
            // send command to clear the remote white board panel
            remoteBoardController.clearBoard();
        }
    }

    /*
     * method called when about menu item moouse pressed
     */
    private void aboutMenuItem_MousePressedEvent(java.awt.event.MouseEvent
evt) {
        // TODO add your handling code here:
        try {
            // create a property object
            Properties prop = new Properties();
            //load the white board properties file
            InputStream inputStream =
this.getClass().getClassLoader().getResourceAsStream("com/compnet/jlm/whiteboar
d/properties/whiteboard.properties");
            prop.load(inputStream);
            // set the about info from the white board properties
            String aboutMessage = prop.getProperty("AppName") + "\n\n"
                    + "Developed By: " + prop.getProperty("DevelopedBy") + "\n"
                    + "Email: " + prop.getProperty("DeveloperEmail");
            // show the info about the white board
            JOptionPane.showMessageDialog(rootPane, aboutMessage, "About",
JOptionPane.INFORMATION_MESSAGE, new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/whiteboard/gui/re
sources/whiteBoardIcon_32x32.png")));

        } catch (FileNotFoundException ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load About
Docs!\nFile Not Found Exception:\n" + ex, "Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
        } catch (IOException ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load About
Docs!\nIO Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
        } catch (Exception ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load About
Docs!\nUnknown Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
        }
    }

    /*
     * method called when help menu mouse pressed
     */
    private void helpMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt)
{
        // TODO add your handling code here:
        try {
            // create a property object
            Properties prop = new Properties();
            //load the white board properties file
            InputStream inputStream =
this.getClass().getClassLoader().getResourceAsStream("com/compnet/jlm/whiteboar
d/properties/whiteboard.properties");
            prop.load(inputStream);
            // set the help info from the property
            String helpMessage = prop.getProperty("AppHelp");
            // show the help info
            JOptionPane.showMessageDialog(rootPane, helpMessage, "Help",
JOptionPane.INFORMATION_MESSAGE, new
javax.swing.ImageIcon(getClass().getResource("/com/compnet/jlm/whiteboard/gui/re
sources/whiteBoardIcon_32x32.png")));

        } catch (FileNotFoundException ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load Help
Docs!\nFile Not Found Exception:\n" + ex, "Error",
JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
        } catch (IOException ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load Help
Docs!\nIO Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
        } catch (Exception ex) {
            JOptionPane.showMessageDialog(rootPane, "Error! Cannot Load Help
Docs!\nUnknown Exception:\n" + ex, "Error", JOptionPane.ERROR_MESSAGE);
            Logger.getLogger(WhiteBoardFrame.class.getName()).log(Level.SEVERE,
null, ex);
        }
    }

    /*
     * method called when the chalk colour selection button mouse pressed
     */
    private void
controls_chalkColorButton_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // set the chalk color from color chooser
        chalkColor = JColorChooser.showDialog(this, "Select Chalk Color",
Color.BLACK);
        // set the white board chalk color
        whiteBoardPanel.setChalkColor(chalkColor);
        // if remote board controller present then send chalk color set command
        if (remoteBoardController != null) {
            remoteBoardController.setChalkColor(chalkColor);
        }
        updateControlPanelButtonAttributes();
    }

    /*
     * method called when board color selection button mouse pressed
     */
    private void
controls_boardColorButton__MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // set the board color from the color chooser
        boardColor = JColorChooser.showDialog(this, "Select Board Color",
Color.WHITE);
        // set the current white board panel board color
        whiteBoardPanel.setBoardColor(boardColor);
        // if remote board controller present then send the command to set the board
color
        if (remoteBoardController != null) {
            remoteBoardController.setBoardColor(boardColor);
        }
        // update the control panel button attributes
        updateControlPanelButtonAttributes();
    }

    /*
     * method called when chalk size spinner state changed
     */
    private void
controls_chalkSizeSpinner_StateChangedEvent(javax.swing.event.ChangeEvent
evt) {
        // TODO add your handling code here:
        // set the chalk size from the spinner value
        chalkSize = Integer.parseInt(chalkSizeSpinner.getValue().toString());
        // set the current white board panel chalk size
        whiteBoardPanel.setChalkSize(chalkSize);
        // if remote board controller present then send remote board chalk size change
command
        if (remoteBoardController != null) {
            remoteBoardController.setChalkSize(chalkSize);
        }
    }

    /*
     * method called when exit menu mouse pressed
     */
    private void exitMenuItem_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // just dissappear than exitting
        this.setVisible(false);
    }

    /*
     * method called when frame panel mouse pressed
     */
    private void framePanel_MousePressedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // draw onto the white board panel at the mouse location
        whiteBoardPanel.drawOntoBoard(evt.getX(), evt.getY());
        // if remote board controller present then send the draw command at the mouse
coordinates
        if (remoteBoardController != null) {
            remoteBoardController.drawOntoBoard(evt.getX(), evt.getY());
        }
    }

    /*
```

```
     * method called when frame panel mouse dragged
     */
    private void framePanel_MouseDraggedEvent(java.awt.event.MouseEvent evt) {
        // TODO add your handling code here:
        // draw onto the white board panel at the mouse location
        whiteBoardPanel.drawOntoBoard(evt.getX(), evt.getY());
        // if remote board controller present then send the draw command at the mouse
coordinates
        if (remoteBoardController != null) {
            remoteBoardController.drawOntoBoard(evt.getX(), evt.getY());
        }
    }

    /*
     * method called when frame panel component resized
     */
    private void
framePanel_ComponentREsizedEvent(java.awt.event.ComponentEvent evt) {
        // TODO add your handling code here:
        // resize the current white board panel
        whiteBoardPanel.resizeBoard(this.getWidth(), this.getHeight());
        // if remote board controller is present then send command to resize the remote
board
        if (remoteBoardController != null) {
            remoteBoardController.resizeBoard(this.getWidth(), this.getHeight());
        }
    }

    /*
     * setter for the control message
     */
    public void setControlMessage(Message controlMessage) {
        // set the control message
        this.controlMessage = controlMessage;
        // create remote board controller and current board controller object
        // by providing the control message as the constructor parameter
        remoteBoardController = new RemoteBoardController(this.controlMessage);
        currentBoardController = new CurrentBoardController(whiteBoardPanel,
this.controlMessage);
    }

    /**
     * @param args the command line arguments
     */
    public static void main(String args[]) {
        /* Set the Nimbus look and feel */
        //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code
(optional) ">
```

```
        /* If Nimbus (introduced in Java SE 6) is not available, stay with the default look
and feel.
         * For details see
http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html
         */
        try {
            for (javax.swing.UIManager.LookAndFeelInfo info :
javax.swing.UIManager.getInstalledLookAndFeels()) {
                if ("Nimbus".equals(info.getName())) {
                    javax.swing.UIManager.setLookAndFeel(info.getClassName());
                    break;
                }
            }
        } catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        } catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        } catch (IllegalAccessException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        } catch (javax.swing.UnsupportedLookAndFeelException ex) {

java.util.logging.Logger.getLogger(WhiteBoardFrame.class.getName()).log(java.util.l
ogging.Level.SEVERE, null, ex);
        }
        //</editor-fold>

        /* Create and display the form */
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new WhiteBoardFrame().setVisible(true);
            }
        });
    }
    // Variables declaration - do not modify
    private javax.swing.JMenuItem aboutMenuItem;
    private javax.swing.JButton boardColorButton;
    private javax.swing.JButton chalkColorButton;
    private javax.swing.JSpinner chalkSizeSpinner;
    private javax.swing.JMenuItem clearBoardMenuItem;
    private javax.swing.JPanel controlPanel;
    private javax.swing.JMenu editMenu;
    private javax.swing.JMenuItem exitMenuItem;
    private javax.swing.JMenu fileMenu;
    private javax.swing.JPanel framePanel;
    private javax.swing.JMenu helpMenu;
    private javax.swing.JMenuItem helpMenuItem;
    private javax.swing.JMenuBar menuBar;
    private javax.swing.JMenuItem newMenuItem;
    private javax.swing.JMenuItem openMenuItem;
    private javax.swing.JMenuItem saveAsMenuItem;
    private javax.swing.JMenuItem saveMenuItem;
    // End of variables declaration
}
```

WhiteBoard.properties

```
AppName = White Board
DevelopedBy = Team NGHS
DeveloperEmail = aboutus@gmail.com
AppHelp =\
- Draw onto the board using the chalk.\n\
- Change color of the chalk and board using the controls buttons.\n\
- Change the chalk size using the chalk size spinner.\n\
- Select save option from the file menu to save the drawn image.\n\
- Select clear option from the edit menu to clear the white board.
```

ContrastColor.java

```
package com.compnet.jlm.whiteboard.utils;

import java.awt.Color;

/**
 *
 * @author Nikesh
 */

/*
 * this class provides method to calculate the contrast color for the jbutton
 * which is used to select chalk and board colors and set their color to the
 * selected colors. the calculated contrast color is set to the text within the
 * jbutton else the text dissapears ( eg. the default text color for the jbutton
 * is black and if the user selects black color the jbutton background color is
 * set to black so the text dissappers
 */
public class ContrastColor {
    public static Color getContrastColor(Color color) {
        // Counting the perceptive luminance - human eye favors green color...
        double a = 1 - (0.299 * color.getRed() + 0.587 * color.getGreen() + 0.114 *
color.getBlue()) / 255;

        if (a < 0.5) {
            return Color.BLACK; // bright colors - black font
        } else {
            return Color.WHITE; // dark colors - white font
        }
    }
}
```