**TURTLE GRAPHICS (PROTOCOL + CLIENT + SERVER)**

Protocol Conventions:

The Turtle Client and the Turtle Server interacts with the following controls after establishing the connection over an IP address and a specified port number.

**First run the TurtleServer.java and then start executing the TurtleClient.java**

The Turtle Server is programmed to accept multiple client requests using java multithreaded server and the server will always stay up and running allowing multiple clients to access the white board and start drawing based on the client GUI i.e. user options.

**Turtle Client execution scenarios:** The Client initially sends a request to Server with a request message and the Server responds by drawing a line in the specified length and direction by the client

The protocol between the client and the server is as follows:

First the user needs to input the IP address, the port number and the length of the line that user wish to draw on the white board. These options are on the top of the Turtle Client GUI click on the **connect to server** button provided on the GUI. The Client tries to connect to server if appropriate values are entered for all the above three mentioned inputs.

After successful establishment of the connection to the server, the user will be able to see several options (we call them as user action buttons ) which he/she can perform on the whiteboard. The options the user can perform are listed below with appropriate server responses.

First of all the actions user should put the pen on the white board to start drawing. To put pen on the white board user needs to click on **Put Pen** button on client GUI - This will disable the Put Pen button and enables rest of all the buttons.

After placing the pen on paper user can do any of the below mentioned actions by clicking on the below mentioned buttons:

**Move Up :** This button is intended to move the turtle in upward direction for user specified length - Server responds by drawing a line in upward direction with user specified length**.**

**Move Down :** This button is intended to move the turtle in Downward direction for user specified length - Server responds by drawing a line in downward direction with user specified length **.**

**Move Left :** **:** This button is intended to move the turtle in left direction for user specified length - Server responds by drawing a line in left direction with user specified length **.**

**Move Right :** **:** This button is intended to move the turtle in Right direction for user specified length - Server responds by drawing a line in Right direction with user specified length

At any point of the time during the user interaction with the client GUI, user can hit **Lift Pen** button this will disable all the user action buttons (except logout button)and user will not able to draw on the white board unless he clicks on the **put pen** button again **-** Server response message will be **The pen is lifted, you cannot use the white board for drawing.**

Also user can hit on **logout** button option available at the bottom of the screen to log off the connection from the server. this will dissolve the server connection and will allow the user to reconnect to the same server or connect to a different server (if there are any) by entering the IP address, the port number of the server and the length of the line that needs to be drawn on the server whiteboard. Server Message - **Client logged out from the server.**