EE 422C Final Project
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Server Design:

This is a classic example of Socket Programming using the Observer Design Pattern. All the information such as users or items are on a MongoDB database. When the server starts up the list of items and users will be populated from the database. Next the server will attempt to set up the networking by creating a server socket waiting for clients to connect. Once a client has connected to the server, a new ClientHandler thread is created for the client that has just connected.

We use a ClientHandler class which uses the runnable and observer interfaces. This has the following methods sendItemInfo(), updateItemInfo(), addUser(), verifyUser(), run(), update(). The sendItemInfo() method is used when the client first starts up and is sent all the item information. The updateItemInfo() method updates the item's information and user history. The notifyObservers(item) is then used to send the updated information for all the Clients. addUser() added a newly created user to the database. verifyUser() is called when a client tries to login and the server must verify the username and password. The run() method is continuously running waiting for requests and completing the request by calling the methods above. The update() will update the Client's for items or users.

The Client class will set up the networking and create a new thread which will continuously get inputs from the server and execute the method for the given input. The Client class will also create a GUI with all the required buttons, text fields, texts, etc. For more information on the GUI please refer to the section below.

How to use the Client:

As a user, once the client has first started up you will see a greeting, two buttons to login or signup and all the items up for auction. Be aware as a guest you may not place a bid nor may you buy any items but you will be able to view the live auction as others place bids. You will also be able to see the previous history of the bids for all items.

You must login to your account or create a new account by clicking sign-up. If you select sign-up you will be prompted to create a username, enter your first name, a password, and confirm the password. A username must be 6-15 characters long and the password must be at least 6 characters and both passwords must match. You may check the show password box which will show the password. If the username you have chosen already exists in the database, you will be

prompted to choose another username. Once you have successfully created an account, you will be automatically brought to the home screen, but not logged in.

Once you have created your account, you may click login and enter the correct information. Again here you have the option to show the password while you are inputting it. Be aware you must hide the password before submitting or an error message will appear reminding you to unselect the show password before submitting. If the login is unsuccessful for any reason (i.e. no username found or incorrect password) then you will be given an error message saying such. If the login is successful, you will be given a successful login message and will be automatically brought back to the home screen.

Now as a user logged in, you may place bids or buy items. Every time you place a bid or buy an item, there will be a ka-ching sound. Once a bid is placed, this will show up in your history which you can access by clicking “My Profile” at the top of the screen. My Profile will show the bid/ buy history with the most recent action coming first. Items name and the bid price will be shown. If you bought the item, the item name and the buy price will be shown along with the “(bought)” tag. Remember a valid bid must be greater than the current bid and less than the buy now price of the item. Once you place a bid or buy an item, it will appear in the item's history, which can be accessed by clicking on the “More Info” button next to the name of each item. This item history will show all the bid history of an item. This will include the user’s name and the amount they placed a bid for.

If an item has been bought by you or another customer, the item will say “Sold to <user’s name> for <buy price>.” The buy now and bid functionality will disappear leaving only the sold message, item name, and item image. You will still have the ability to access the item’s history, if it has been sold. The last information on the item will have the user who bought it and the “(bought)” tag, similar to user’s “My Profile”.

User’s may logout during the session, which will automatically bring you back to a guest account and you will not be able to place bids or buy items until you have logged in again.

Look at the figures below to see the visuals on the features mentioned above.

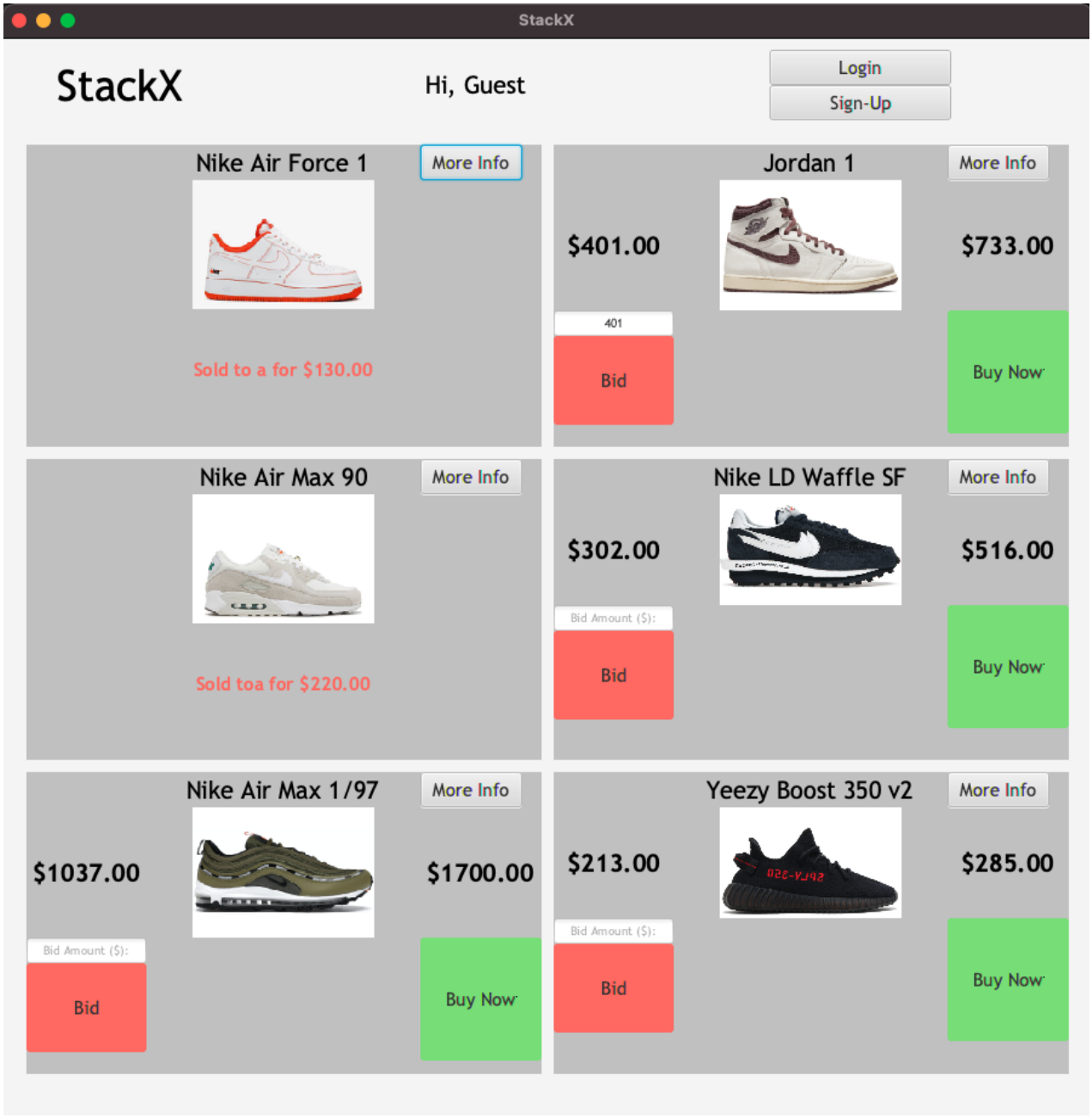

Figure 1: Overview of the GUI

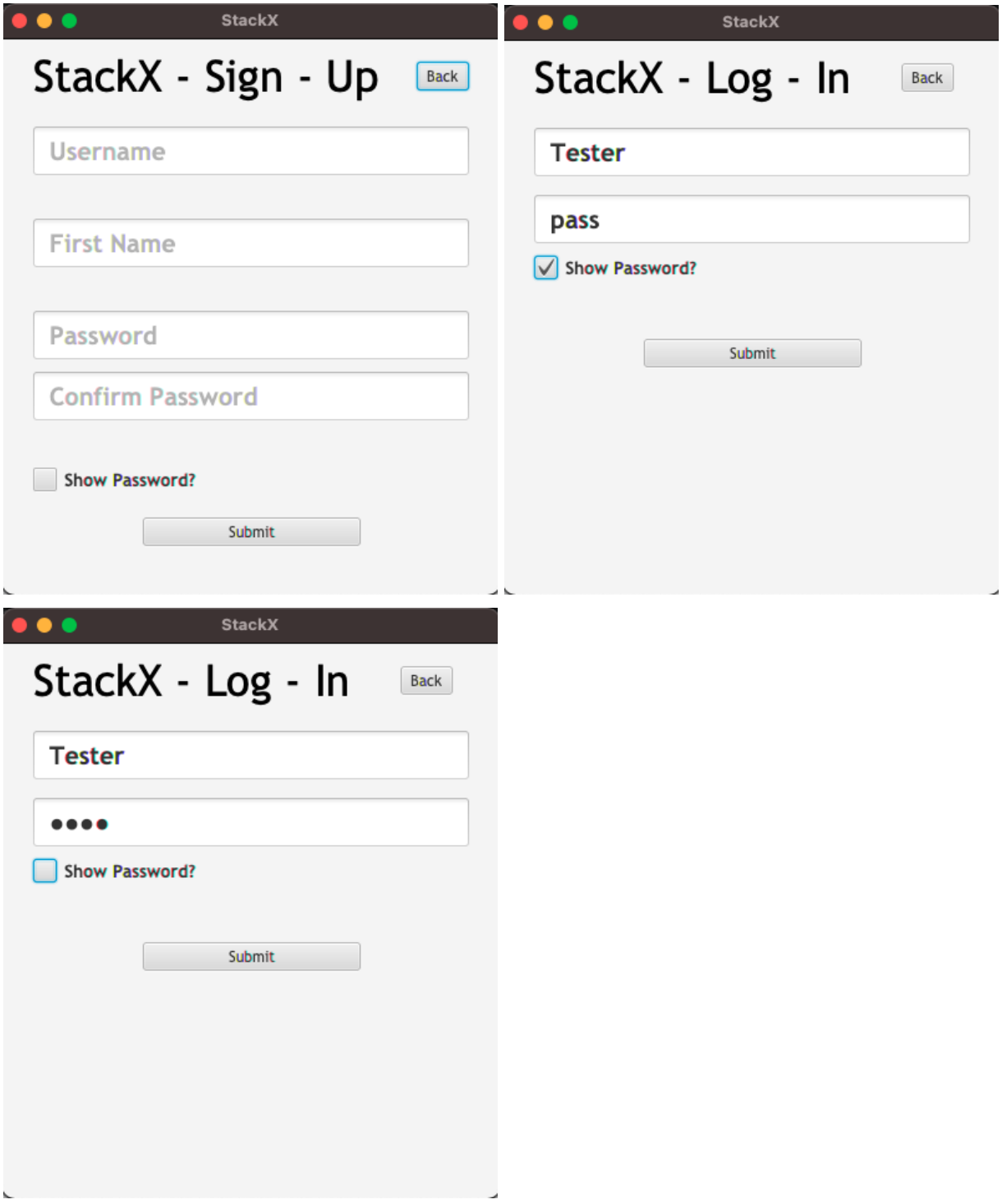

Figure 2: Login and Signup Pages

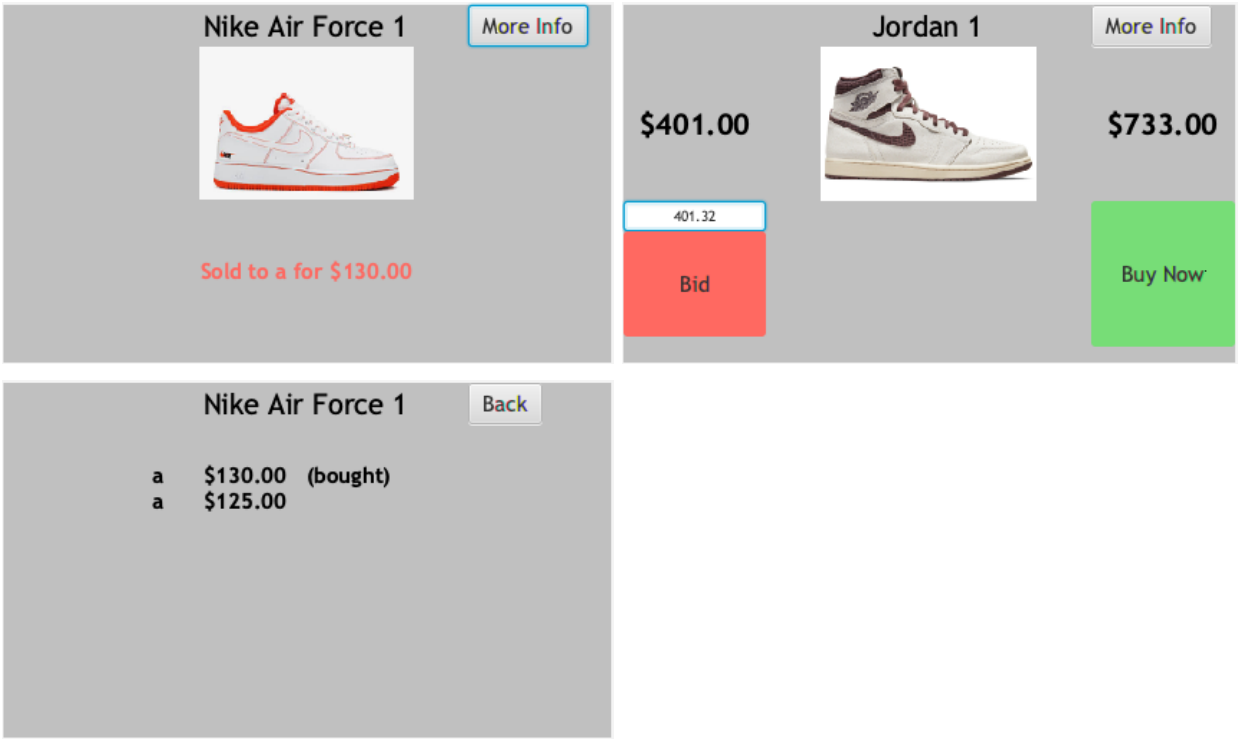

Figure 3: Items Visuals

References:
Restricting text fields to only double:
https://stackoverflow.com/questions/7555564/what-is-the-recommended-way-to-make-a-numeric-textfield-in-javafx

References to created JSON objects:
https://stackoverflow.com/questions/20117148/how-to-create-json-object-using-string
https://programtalk.com/java-api-usage-examples/com.google.gson.JsonObject/
https://www.tabnine.com/code/java/methods/com.google.gson.JsonElement/getAsJsonObject
http://www.javased.com/?api=com.google.gson.JsonParser
https://stackoverflow.com/questions/2591098/how-to-parse-json-in-java
https://mkyong.com/java/how-do-convert-java-object-to-from-json-format-gson-api/

Database:
https://pentagonal-box-4e4.notion.site/EE422C-MongoDB-Atlas-Java-Tutorial-52ebda46cb86473880b72548d5b29bd6

Password Hashing:
http://www.javased.com/index.php?api=java.security.MessageDigest