SOFE 4790U : Distributed Systems

Individual Programming Assignment #1

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Due Date: Oct 20, 2021

Link to GitHub:

Assignment (clone) : https://github.com/UOITEngineering2/assignment1fall2020-OwaisQuadri
Personal (original): https://github.com/OwaisQuadri/DSYS_A1

A. Application Description: Academic Testing Application

This application is an academic testing system where a supervisor/teacher can hold multiple choice tests for a group of students. The supervisor server will ask a multiple choice question and also give possible answers. The subjects who will take the test (clients) will answer the questions as they are sent out asynchronously from the supervisor. One significant function is testing and accurately displaying the subject's score to themselves. This system can accept many students taking the test at the same time. Another significant function is that the supervisor will be able to customize questions and possible answers for the test (there can be more than one answer). The supervisor will let the system know of the correct answer by including an exclamation mark ('!') at the start of that answer when creating the test. One novel feature is that each test, and the test scores (and students' names) are recorded in a file so that they can be used at a later time so that the admin does not need to create the test on each run. An exam writer could create the tests, and the supervisor would only need to sign in and "accept submissions". One test is not limited to one class session. Another novel feature of this application is that each user (student or supervisor) uses a unique username and password to gain access to the system. Also, the supervisors can view results of their tests such as the amount of submissions, the average score, the highest score, and the lowest score.

Challenges that I faced during this project were: In the beginning, I had a very difficult time accepting input from the socket to each side of the client/server model. I solved this problem by referring back to lecture notes and some videos where I realized that I need to use "writer.flush()" every time I use the writer. Another challenge I faced was creating a system where the supervisor server would be able to compile all the results of a certain test. I was wondering how to send messages from one thread to the main server file. I solved this problem by writing each user's results to a file (append) on a separate thread and reading the file on the main server to achieve this communication.

My user interface was on the command line. The users would need to enter their username and password to gain access and continue into the application. Firstly, the supervisor would need to connect. Until the supervisor does not allow submissions of a certain test to begin, the students will not be able to enter into the application. The next steps for this application would be to ensure that the same user is not taking a test more than once, or any specified amount of times. Another element to be added would be the ability for multiple servers to run different tests and the students would connect to the test by adding a specified test-key.

B. Functionality Testing (with screenshots)

Main Features:

Testing and accurately displaying the subject's score to themselves:


```
Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Client.Student owais owais
Server status: connected

ExampleTest

How many cards are in a deck of cards?
1. 25
2. 50
3. 52
4. 35
3
Tallest Building?
1. CN Tower
2. Eiffel Tower
3. Burj Khalifa
4. the leaning tower of Pisa
3
What is my name?
1. Owais
2. Owais Quadri
3. 100697281
4. Johnathan
2
Your score was : 100.00 %
```
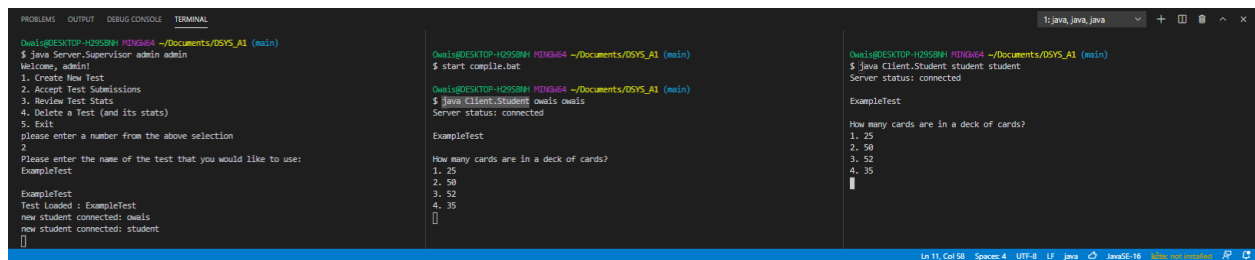
```
Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Client.Student student student
Server status: connected

ExampleTest

How many cards are in a deck of cards?
1. 25
2. 50
3. 52
4. 35
3
Tallest Building?
1. CN Tower
2. Eiffel Tower
3. Burj Khalifa
4. the leaning tower of Pisa
4
What is my name?
1. Owais
2. Owais Quadri
3. 100697281
4. Johnathan
1
Your score was : 66.67 %
```

Multiple Students can take the test at the same time:


```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL                                                                    1: java, java, java

Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Server.Supervisor admin admin
Welcome, admin!
1. Create New Test
2. Accept Test Submissions
3. Review Test Stats
4. Delete a Test (and its stats)
5. Exit
please enter a number from the above selection
2
Please enter the name of the test that you would like to use:
ExampleTest

ExampleTest
Test Loaded : ExampleTest
new student connected: owais
new student connected: student

Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ start compile.bat

Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Client.Student owais owais
Server status: connected

ExampleTest

How many cards are in a deck of cards?
1. 25
2. 50
3. 52
4. 35

Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Client.Student student student
Server status: connected

ExampleTest

How many cards are in a deck of cards?
1. 25
2. 50
3. 52
4. 35
```
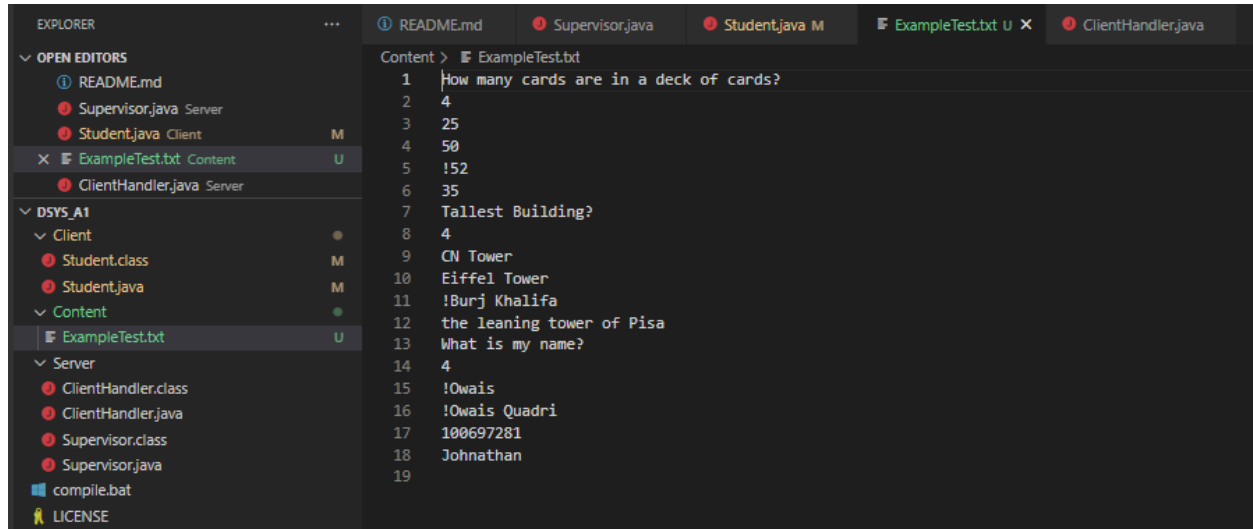
The supervisor will be able to customize questions and possible answers for the test:

```
Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Server.Supervisor admin admin
Welcome, admin!
1. Create New Test
2. Accept Test Submissions
3. Review Test Stats
4. Delete a Test (and its stats)
5. Exit
please enter a number from the above selection
1
What would you like to name the Test / Poll: ExampleTest
Would you like to add a question? (y/n) y
How many cards are in a deck of cards?
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
25
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
50
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
!52
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
35
Would you like to add an answer to this question? (y/n) n
Would you like to add a question? (y/n) y
Tallest Building?
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
CN Tower
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
Eiffel Tower
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
!Burj Khalifa
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
the leaning tower of Pisa
Would you like to add an answer to this question? (y/n) n
Would you like to add a question? (y/n) y
What is my name?
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
!Owais
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
!Owais Quadri
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
100697281
Would you like to add an answer to this question? (y/n) y
please add a '!' to the beginning if this is the correct answer
Johnathan
Would you like to add an answer to this question? (y/n) n
Would you like to add a question? (y/n) n
File created: ExampleTest.txt
Test / Poll Created : ExampleTest
```

Novel Features:
each test, and the test scores (and students' names) are recorded in a file so that they can be used
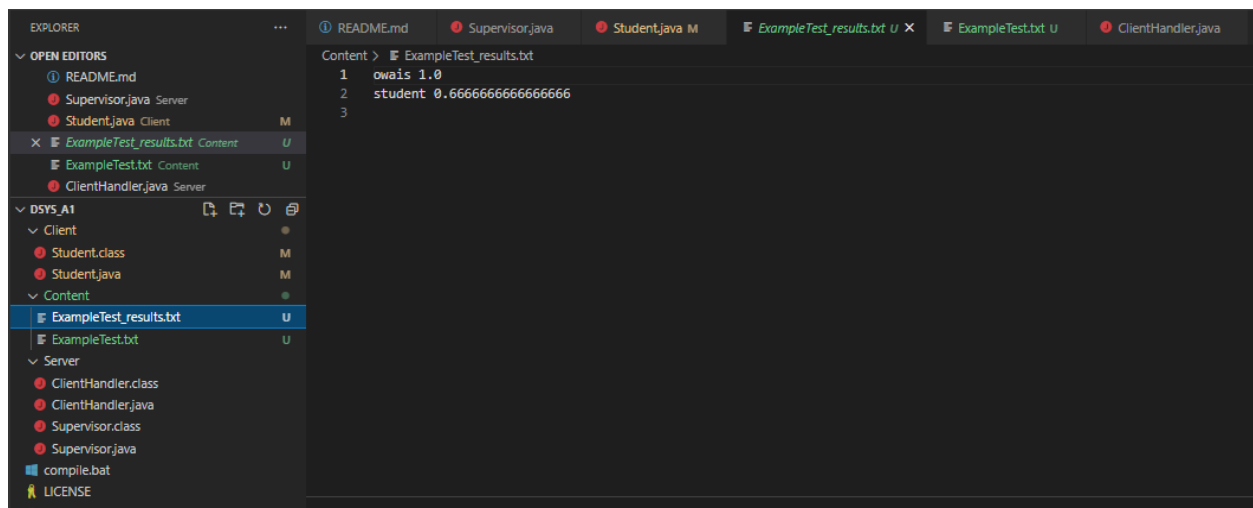at a later time so that the admin does not need to create the test on each run:
Test layout file:

Test Results File:

An exam writer could create the tests, and the supervisor would only need to sign in and "accept submissions":

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL

Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Server.Supervisor admin admin
Welcome, admin!
1. Create New Test
2. Accept Test Submissions
3. Review Test Stats
4. Delete a Test (and its stats)
5. Exit
please enter a number from the above selection
2
Please enter the name of the test that you would like to use:
ExampleTest

ExampleTest
Test Loaded : ExampleTest
new student connected: owais
new student connected: student
[]
```

User (student or supervisor) uses a unique username and password to gain access to the system:

```
Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Server.Supervisor admin admin
Welcome, admin!
```

The supervisors can view results of their tests such as the amount of submissions, the average score, the highest score, and the lowest score:

```
Owais@DESKTOP-H29SBNH MINGW64 ~/Documents/DSYS_A1 (main)
$ java Server.Supervisor admin admin
Welcome, admin!
1. Create New Test
2. Accept Test Submissions
3. Review Test Stats
4. Delete a Test (and its stats)
5. Exit
please enter a number from the above selection
3
Please enter the name of the test that you would like to use:
ExampleTest

ExampleTest
Test Loaded : ExampleTest
Number of attempts overall: 2
Average Score: 83.33 %
Highest Score: 100.00 %
Lowest Score: 66.67 %
```