Submission Worksheet

CLICK TO GRADE

https://learn.ethereallab.app/assignment/IT114-005-F2024/it114-module-5-project-milestone-1/grade/kr553

Course: IT114-005-F2024
Assigment: [IT114] Module 5 Project Milestone 1
Student: Kush R. (kr553)

Submissions:

Submission Selection

1 Submission [submitted] 10/21/2024 11:09:02 PM

Instructions

COLLAPSE

Overview Video: https://youtu.be/A2yDMS9TS1o

1. Create a new branch called Milestone1
2. At the root of your repository create a folder called Project if one doesn't exist yet
    1. You will be updating this folder with new code as you do milestones
    2. You won't be creating separate folders for milestones; milestones are just branches
3. Copy in the code from Sockets Part 5 into the Project folder (just the files)
    2. https://github.com/MattToegel/IT114/tree/M24-Sockets-Part5
4. Fix the package references at the top of each file (these are the only edits you should do at this point)
5. Git add/commit the baseline and push it to github
6. Create a pull request from Milestone1 to main (don't complete/merge it yet, just have it in open status)
7. Ensure the sample is working and fill in the below deliverables 1. Note: Don't forget the client commands are /name and /connect
8. Generate the output file once done and add it to your local repository
9. Git add/commit/push all changes
10. Complete the pull request merge from the step in the beginning
11. Locally checkout main
12. git pull origin main

Branch name: Milestone1

Group

100%

Group: Start Up
Tasks: 2
Points: 3

COLLAPSE

Task

100%

Group: Start Up
Task #1: Start Up
Weight: ~50%
Points: ~1.50

COLLAPSE

Details:

Important: Code screenshots should be fairly concise (try to show only the sections of code relevant to the question)

Capturing all possible code (i.e., including a lot of irrelevant code) can lead to a reduced grade.

Columns: 1

Sub-Task

100%

Group: Start Up
Task #1: Start Up
Sub Task #1: Show the Server starting via command line and listening for connections

Task Screenshots

Gallery Style: 2 Columns

4 2 1

Server listning connections

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task

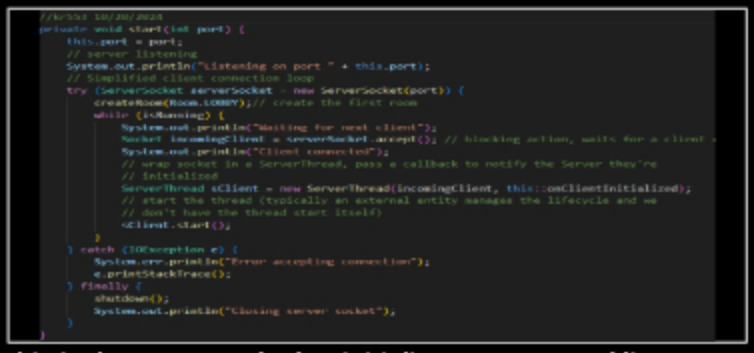
100%

Group: Start Up
Task #1: Start Up
Sub Task #2: Show the Server Code that listens for connections

Task Screenshots

Gallery Style: 2 Columns

4 2 1



this is the server code that initializes on start and listnes any connections

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code related to starting up and waiting for connections

Response:

A server opens a ServerSocket and provides the service of waiting for connection requests from a client. Each connection makes a new ServerThread that will handle client requests and therefore it includes multple clients. Frequency issues during connection are recorded while the server goes on to accept other clients.

Sub-Task

100%

Group: Start Up

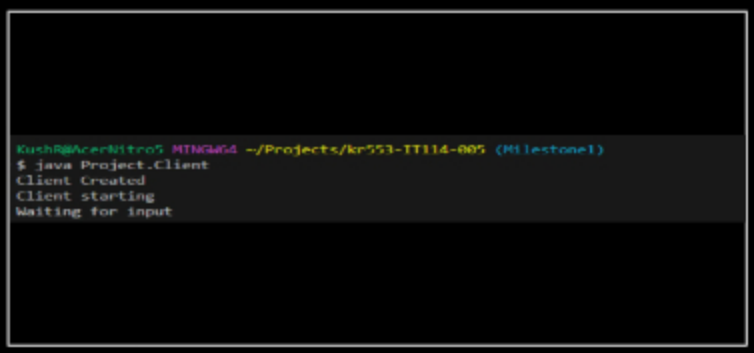
Task #1: Start Up

Sub Task #3: Show the Client starting via command line

Task Screenshots

Gallery Style: 2 Columns

4 2 1



Client starting

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task

100%

Group: Start Up

Task #1: Start Up

Sub Task #4: Show the Client Code that prepares the client and waits for user input

Task Screenshots

Gallery Style: 2 Columns

4 2 1

this function prepares client and wait for the input.

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow leading up to and including waiting for user input

Response:

By use of `CompletableFuture` the client's `start()` method invokes `listenToInput()` that reads user input under the help of `Scanner`. Input such as `/connect` is executed by the bot whilst all other inputs are forwarded as messages up to the moment the client disconnects (`IsRunning` is `False`).

End of Task 1

Task

100%

Group: Start Up
Task #2: Connecting
Weight: ~50%
Points: ~1.50

COLLAPSE

Details:

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Columns: 1

Sub-Task

100%

Group: Start Up
Task #2: Connecting
Sub Task #1: Show 3 Clients connecting to the Server

Task Screenshots

Task Screenshots

Gallery Style: 2 Columns

4 2 1

3 clients connected to the server

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task

100%

Group: Start Up

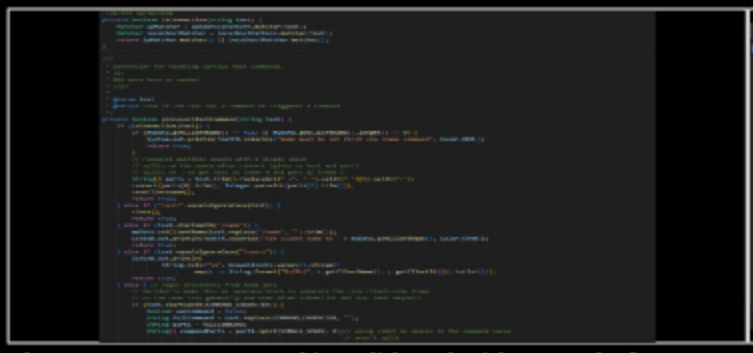
Task #2: Connecting

Sub Task #2: Show the code related to Clients connecting to the Server (including the two needed commands)

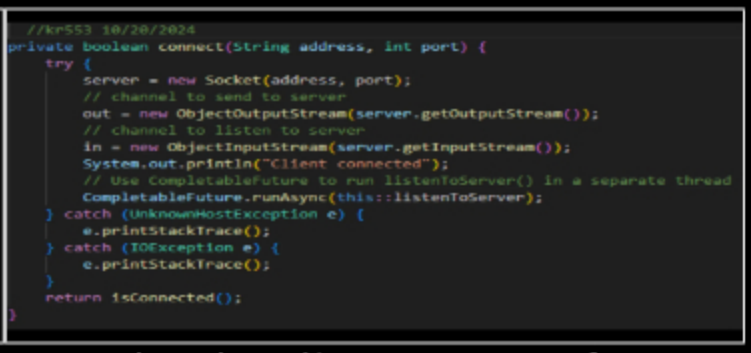
Task Screenshots

Gallery Style: 2 Columns

4 2 1



The /connect command is validated with regex before calling connect().



```
//kr553 10/20/2024
private boolean connect(String address, int port) {
    try {
        server = new Socket(address, port);
        // channel to send to server
        out = new ObjectOutputStream(server.getOutputStream());
        // channel to listen to server
        in = new ObjectInputStream(server.getInputStream());
        System.out.println("Client connected");
        // Use CompletableFuture to run listenToServer() in a separate thread
        CompletableFuture.runAsync(this::listenToServer);
    } catch (UnknownHostException e) {
        e.printStackTrace();
    } catch (IOException e) {
        e.printStackTrace();
    }
    return isConnected();
}
```

It sets up the socket and input/output streams for communication.

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow

Response:

The client connects to the server via `/connect [host]:[port]` The command string is validated and checked in the 'processClientCommand()' function while socket connection in the server is done by 'connect()'. Upon connection sendClientName()is invoked and Upon entering/quit, the connection is closed with close()`.

End of Task 2

End of Group: Start Up
Task Status: 2/2

Group

100%

Group: Communication
Tasks: 2
Points: 3

COLLAPSE

Task

100%

Group: Communication
Task #1: Communication
Weight: ~50%
Points: ~1.50

COLLAPSE

Details:
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Columns: 1

Sub-Task

100%

Group: Communication
Task #1: Communication
Sub Task #1: Show each Client sending and receiving messages

Task Screenshots

Gallery Style: 2 Columns

4 2 1

On the server side and all the clients side all can hear messages

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task

100%

Group: Communication
Task #1: Communication
Sub Task #2: Show the code related to the Client-side of getting a user message and sending it over the socket

Task Screenshots

Gallery Style: 2 Columns

4 2 1

This method listens for user input through the console and processes the input.

```
private void sendMessage(String message) {
    Payload p = new Payload();
    p.setPayloadType(PayloadType.MESSAGE);
    p.setMessage(message);
    send(p);
}
```

This method packages the user message into a Payload object, sets the payload type to MESSAGE, and then sends it to the server

```
private void send(Payload p) {
    try {
        out.writeObject(p);
        out.flush();
    } catch (IOException e) {
        e.printStackTrace();
    }

}
// end send methods
```

The send() method writes the Payload object to the ObjectOutputStream connected to the server.

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

The `listenToInput()` method takes care of checking the user input, whether it be a connection string, such as `connect`, or a message to be sent to the connected server, while `sendMessage()` builds up a `Payload` of type `MESSAGE` and forwards it to the server so that the door to constant communication between the client and server is open.

Sub-Task

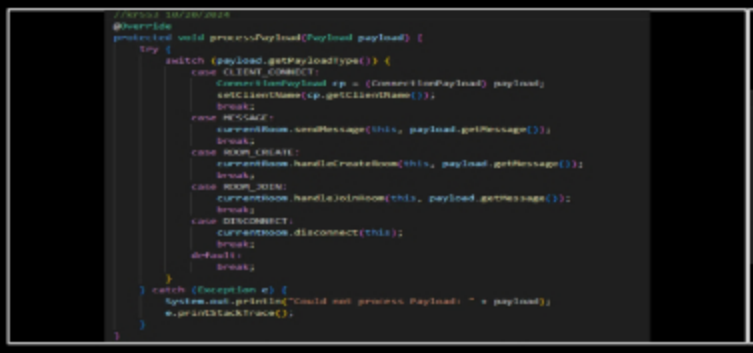
100%

Group: Communication
Task #1: Communication
Sub Task #3: Show the code related to the Server-side receiving the message and relaying it to each connected Client

Task Screenshots

Gallery Style: 2 Columns

4 2 1



The server calls sendMessage() to broadcast MESSAGE payloads to other connected clients.

```
//kr553 10/20/2024
public boolean sendMessage(long senderId, String message) {
    Payload p = new Payload();
    p.setClientId(senderId);
    p.setMessage(message);
    p.setPayloadType(PayloadType.MESSAGE);
    return send(p);
}
```

sendMessage() forwards the message to all clients except the original sender.

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

The `ServerThread` interacts with client's messages and pass it to the room's `sendMessage()` method. The room also informs the other clients of the messages in the room excluding the sender in real time hence the communication in the room.

Sub-Task

100%

Group: Communication

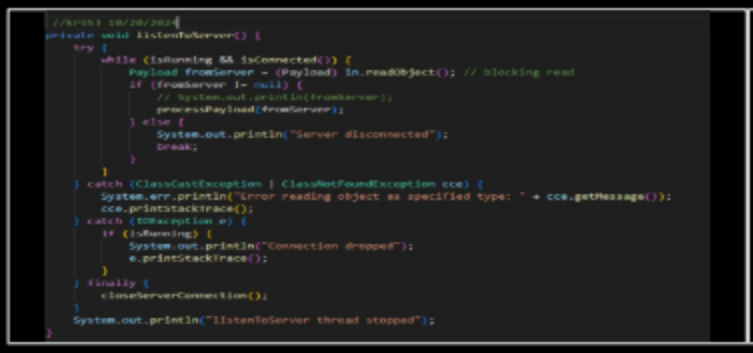
Task #1: Communication

Sub Task #4: Show the code related to the Client receiving messages from the Server-side and presenting them

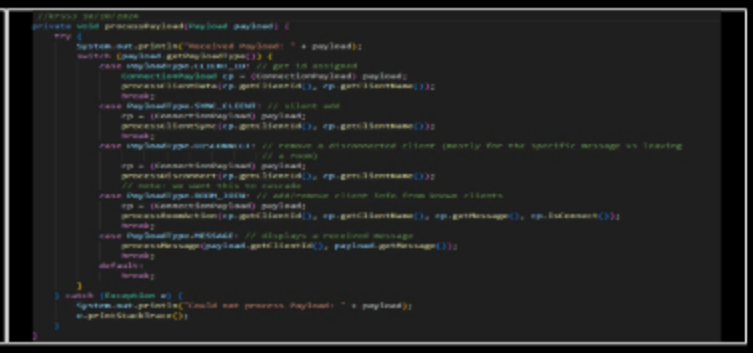
Task Screenshots

Gallery Style: 2 Columns

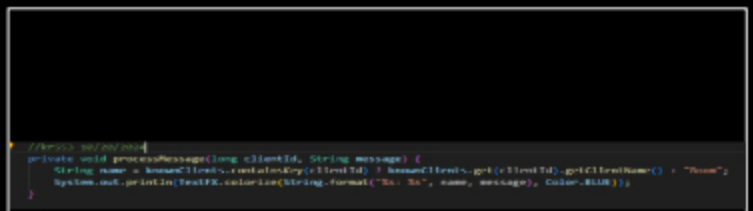
4 2 1



The method continuously listens, blocking on input, then processes received server messages.



The client processes payloads, extracts and displays message content if type MESSAGE.



The processMessage() method takes the message and the sender's information, then prints it to the console.

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

The `listenToServer()` method corresponds to the listening of message from the server and; When the server has something to send through the messageParameter it gives it a `Payload` before sending it to the `processPayload()` method. If the received message is of type MESSAGE then `processMessage()` function message is shown to the client. This configuration means that the client and the server can easily exchange data in real time so messages passed and presented whenever they are received.

End of Task 1

Task

100%

Group: Communication
Task #2: Rooms
Weight: ~50%
Points: ~1.50

COLLAPSE

Details:

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Columns: 1

Sub-Task

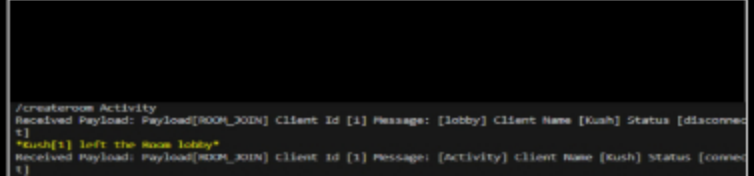
100%

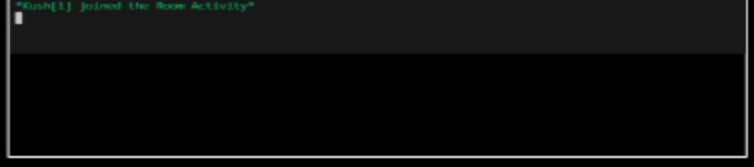
Group: Communication
Task #2: Rooms
Sub Task #1: Show Clients can Create Rooms

Task Screenshots

Gallery Style: 2 Columns

4 2 1





Creadted room and joined

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task 100%

Group: Communication
Task #2: Rooms
Sub Task #2: Show Clients can Join Rooms (leave/join messages should be visible)

Task Screenshots

Gallery Style: 2 Columns

4 2 1

Cleints joining other room thean lobby created by client 1

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

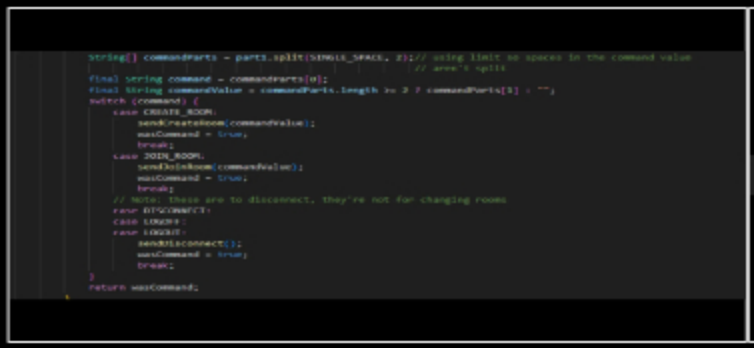
Sub-Task 100%

Group: Communication
Task #2: Rooms
Sub Task #3: Show the Client code related to the create/join room commands

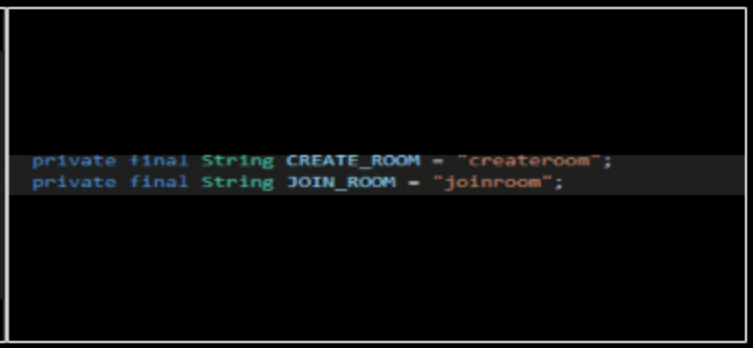
Task Screenshots

Gallery Style: 2 Columns

4 2 1



Client code for create and join rooms



initialized here

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

We will also provide in the `processClientCommand()` method the control for such client commands provided for example with `/createroom` or `/joinroom`. Depending upon the command it sends either `sendCreateRoom()` or `sendJoinRoom()` which in return creates a `Payload` consisting of name of room which is then send to the server.

Sub-Task

100%

Group: Communication

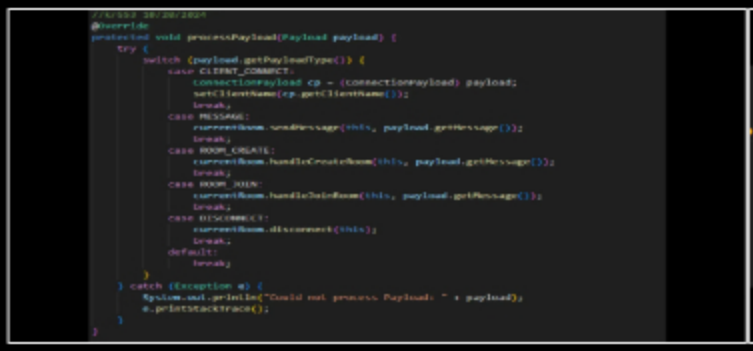
Task #2: Rooms

Sub Task #4: Show the ServerThread/Room code handling the create/join process

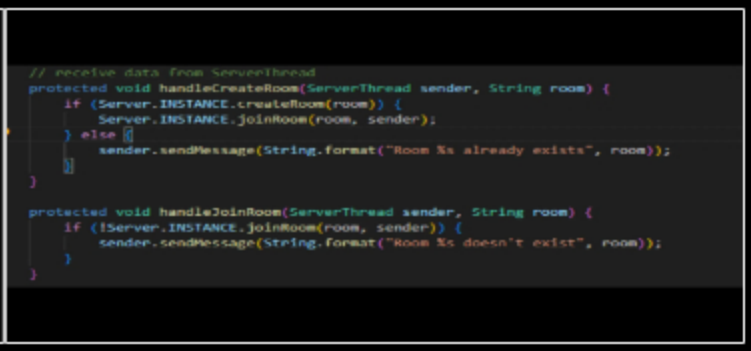
Task Screenshots

Gallery Style: 2 Columns

4 2 1



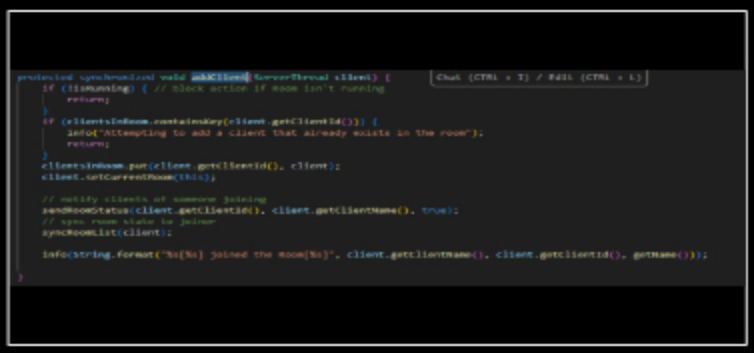
```
@Override
protected void processPayload(Payload payload) {
    try {
        switch (payload.getPayloadType()) {
            case CLIENT_CONNECT:
                ConnectionPayload cp = (ConnectionPayload) payload;
                setClientName(cp.getClientName());
                break;
            case MESSAGE:
                currentRoom.sendMessage(this, payload.getMessage());
                break;
            case ROOM_CREATE:
                currentRoom.handleCreateRoom(this, payload.getMessage());
                break;
            case ROOM_JOIN:
                currentRoom.handleJoinRoom(this, payload.getMessage());
                break;
            case DISCONNECT:
                currentRoom.disconnect(this);
                break;
            default:
                break;
        }
    } catch (Exception e) {
        System.out.println("Could not process Payload: " + payload);
        e.printStackTrace();
    }
}
```



```
// receive data from ServerThread
protected void handleCreateRoom(ServerThread sender, String room) {
    if (Server.INSTANCE.createRoom(room)) {
        Server.INSTANCE.joinRoom(room, sender);
    } else {
        sender.sendMessage(String.format("Room %s already exists", room));
    }
}

protected void handleJoinRoom(ServerThread sender, String room) {
    if (!Server.INSTANCE.joinRoom(room, sender)) {
        sender.sendMessage(String.format("Room %s doesn't exist", room));
    }
}
```

1. Handling Room Creation (ROOM_CREATE): handeling cerating and joining room



```
protected synchronized void addClient(ServerThread client) {
    if (!isRunning) { // block action if room isn't running
        return;
    }
    if (clientsInRoom.containsKey(client.getClientId())) {
        info("Attempting to add a client that already exists in the room");
        return;
    }
    clientsInRoom.put(client.getClientId(), client);
    client.setCurrentRoom(this);

    // notify clients of someone joining
    sendRoomStatus(client.getClientId(), client.getClientName(), true);
    // sync room state to joiner
    syncRoomList(client);

    info(String.format("%s[%s] joined the room[%s]", client.getClientName(), client.getClientId(), getName()));
}
```

handles the joining/lefting room messages

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

The `processPayload()` method serves clients' requests of creating a new room or joining an existing room or booth
The `handleCreateRoom()` method creates a new room and sends a message to the client requesting room creation
The `handleJoinRoom()` method assigns the client to an existing room or sends a message if the room is unavailable.

Sub-Task

100%

Group: Communication
Task #2: Rooms
Sub Task #5: Show the Server code for handling the create/join process

Task Screenshots

Gallery Style: 2 Columns

4 2 1

Server code for handling the create/join process

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

Most of the actions are similar to `joinRoom()`, which transfers clients to different rooms; `removeRoom()` erases a room from the server. The `main()` same as the previous program method initializes the server and assigns a port, which waits for connections quickly.

Sub-Task

100%

Group: Communication
Task #2: Rooms
Sub Task #6: Show that Client messages are constrained to the Room (clients in different Rooms can't talk to each other)

Task Screenshots

Gallery Style: 2 Columns

4 2 1

This method sends a message to all clients currently in the room (clientsInRoom)

Caption(s) (required) ✓
Caption Hint: *Describe/highlight what's being shown*

Task Response Prompt

Briefly explain why/how it works this way

Response:

This preserves messages to a room by only sending messages to clients in that room thus preventing cross-room communications. Pros include methods like thread-safe, synchronized methods which do not allow problems that exist in many-thread application.

End of Task 2

End of Group: Communication
Task Status: 2/2

Group

100%

Group: Disconnecting/Termination
Tasks: 1
Points: 3

COLLAPSE

Task

100%

Group: Disconnecting/Termination
Task #1: Disconnecting
Weight: ~100%
Points: ~3.00

COLLAPSE

Details:

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Columns: 1

Sub-Task

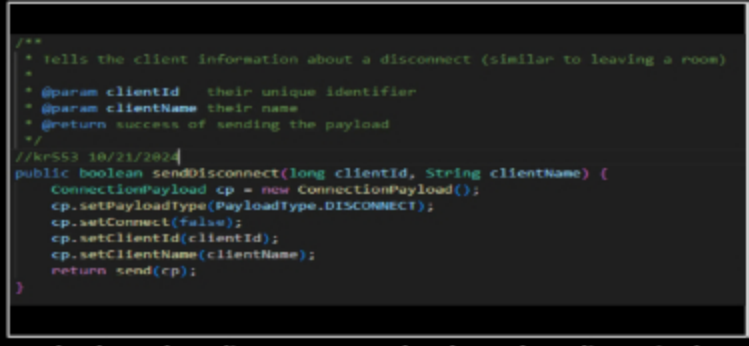
100%

Group: Disconnecting/Termination
Task #1: Disconnecting
Sub Task #1: Show Clients gracefully disconnecting (should not crash Server or other Clients)

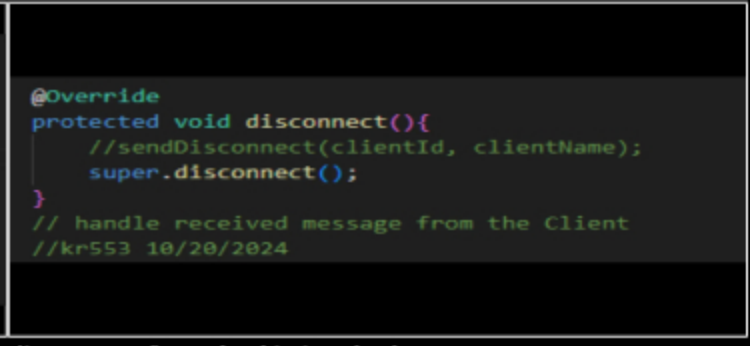
Task Screenshots

Gallery Style: 2 Columns

4 2 1



```java
/**
 * tells the client information about a disconnect (similar to leaving a room)
 *
 * @param clientId   their unique identifier
 * @param clientName their name
 * @return success of sending the payload
 */
//kr553 10/21/2024
public boolean sendDisconnect(long clientId, String clientName) {
    ConnectionPayload cp = new ConnectionPayload();
    cp.setPayloadType(PayloadType.DISCONNECT);
    cp.setConnect(false);
    cp.setClientId(clientId);
    cp.setClientName(clientName);
    return send(cp);
}
```



```java
@Override
protected void disconnect(){
    //sendDisconnect(clientId, clientName);
    super.disconnect();
}
// handle received message from the Client
//kr553 10/20/2024
```

method sends a disconnect payload to other clients in the room, informing them that the client has left.

disconnect() method is invoked

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task

100%

Group: Disconnecting/Termination

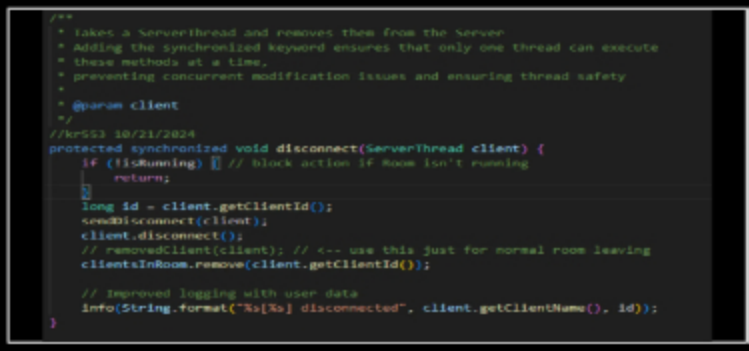
Task #1: Disconnecting

Sub Task #2: Show the code related to Clients disconnecting

Task Screenshots

Gallery Style: 2 Columns

4 2 1



```java
/**
 * Takes a ServerThread and removes them from the server
 * Adding the synchronized keyword ensures that only one thread can execute
 * these methods at a time,
 * preventing concurrent modification issues and ensuring thread safety
 *
 * @param client
 */
//kr553 10/21/2024
protected synchronized void disconnect(ServerThread client) {
    if (!isRunning) { // block action if Room isn't running
        return;
    }
    long id = client.getClientId();
    sendDisconnect(client);
    client.disconnect();
    // removedClient(client); // <-- use this just for normal room leaving
    clientsInRoom.remove(client.getClientId());

    // Improved logging with user data
    info(String.format("%s[%s] disconnected", client.getClientName(), id));
}
```

```java
// send/sync data to client(s)

/**
 * Sends to all clients details of a disconnect client
 * @param client
 */
//kr553 10/21/2024
protected synchronized void sendDisconnect(ServerThread client) {
    info(String.format("Sending disconnect status to %s recipients", getName(), clientsInRoom.size()));
    clientsInRoom.values().removeIf(clientInRoom -> {
        boolean failedToSend = !clientInRoom.sendDisconnect(client.getClientId(), client.getClientName());
        if (failedToSend) {
            info(String.format("Removing disconnected client[%s] from list", client.getClientId()));
            disconnect(clientInRoom);
        }
        return failedToSend;
    });
}
```

server notifies other clients in the room via sendDisconnect() and safely removes the client from the room.

method sends a disconnection notification to all clients

```java
//kr553 10/21/2024
protected synchronized void removedClient(ServerThread client) {
    if (!isRunning) { // block action if Room isn't running
        return;
    }
    // notify remaining clients of someone leaving
    // happen before removal so leaving client gets the data
    sendRoomStatus(client.getClientId(), client.getClientName(), false);
    clientsInRoom.remove(client.getClientId());

    info(String.format("%s[%s] left the room", client.getClientName(), client.getClientId(), getName()));

    autoCleanup();
}
```

method removes the client from the room and notifies other clients.

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

The disconnect() method – clears clients and, after that, sendDisconnect(); removedClient() – cleans the room after clients left. Synchronized methods help in making the required facilities safe from the interference of other threads running during some client activities.

Sub-Task

100%

Group: Disconnecting/Termination
Task #1: Disconnecting
Sub Task #3: Show the Server terminating (Clients should be disconnected but still running)

Task Screenshots

Gallery Style: 2 Columns

4 2 1

```
/**
 * Gracefully disconnect clients
 */
//kr553 10/21/2024
private void shutdown() {
    try {
        //chose removeIf over forEach to avoid potential ConcurrentModificationException
        //since empty rooms tell the server to remove themselves
        rooms.values().removeIf(room -> {
            room.disconnectAll();
            return true;
        });
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

Disconnects clients, removes rooms, and allows clients to continue.

```
//kr553 10/21/2024
private Server(){
    Runtime.getRuntime().addShutdownHook(new Thread(() -> {
        System.out.println("JVM is shutting down. Perform cleanup tasks.");
        shutdown();
    }));
}
```

the shutdown process is triggered

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown*

Sub-Task

100%

Group: Disconnecting/Termination
Task #1: Disconnecting
Sub Task #4: Show the Server code related to handling termination

Task Screenshots

Gallery Style: 2 Columns

4 2 1

```
//kr553 10/21/2024
private Server(){
    Runtime.getRuntime().addShutdownHook(new Thread(() -> {
        System.out.println("JVM is shutting down. Perform cleanup tasks.");
        shutdown();
    }));
}
```

shutdown() method is called to disconnect clients and clean up rooms.

```
/**
 * Gracefully disconnect clients
 */
//kr553 10/21/2024
private void shutdown() {
    try {
        //chose removeIf over forEach to avoid potential ConcurrentModificationException
        //since empty rooms tell the server to remove themselves
        rooms.values().removeIf(room -> {
            room.disconnectAll();
            return true;
        });
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

The shutdown() method disconnects all clients via room.disconnectAll()

Caption(s) (required) ✓

Caption Hint: *Describe/highlight what's being shown (ucid/date must be present)*

Task Response Prompt

Briefly explain the code/logic/flow involved

Response:

The server side's shutdown hook calls function `shutdown ()` that removes rooms and disconnects all the clients and informs all the clients about the termination so they can run locally without getting crashed.

End of Task 1

End of Group: Disconnecting/Termination
Task Status: 1/1

Group

100%

Group: Misc
Tasks: 3
Points: 1

COLLAPSE

Task

100%

Group: Misc
Task #1: Add the pull request link for this branch
Weight: ~33%
Points: ~0.33

COLLAPSE

Task URLs

URL #1
https://github.com/KushDev19/kr553-IT114-005/pull/6

URL
https://github.com/KushDev19/kr553-IT114-005/

End of Task 1

Task

100%

Group: Misc
Task #2: Talk about any issues or learnings during this assignment
Weight: ~33%
Points: ~0.33

COLLAPSE

Details:

Few related sentences about the Project/sockets topics

Task Response Prompt

Response:

there was this issue where i changes the packages first and then compiling using javac, class files were still with module 5 part 5 package name and it was not changing i just simply exhausted trying it numerous times and then i quit the application, after like 3 hours i tries to do it again and it worked i dont know if it was some bug due to which this problem was existing but yeah other then that there were no issues.

End of Task 2

Task

100%

Group: Misc
Task #3: WakaTime Screenshot
Weight: ~33%
Points: ~0.33

COLLAPSE

Details:
Grab a snippet showing the approximate time involved that clearly shows your repository.

The duration isn't considered for grading, but there should be some time involved.

Task Screenshots

Gallery Style: 2 Columns

4 2 1

wakatime

End of Task 3

End of Group: Misc
Task Status: 3/3

End of Assignment