SER 321 A Session

SI Session

Thursday, January 30th 2025

7:00 pm - 8:00 pm MST

Agenda

- Custom Protocol Tips
- Review Socket Steps
- Discuss “Handling the Client”
- Socket Port Examination

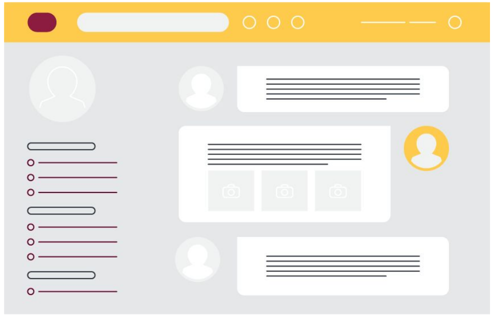
SI Session Expectations

Thanks for coming to the **SER 321** SI session. We have a packed agenda and we are going to try to get through as many of our planned example problems as possible. This session will be recorded and shared with others.

- If after this you want to see additional examples, please visit the drop-in tutoring center.
- We will post the link in the chat now and at the end of the session.
  - tutoring.asu.edu
- Please keep in mind we are recording this session and it will be made available for you to review 24-48 hours after this session concludes.
- Finally, please be respectful to each other during the session.

Interact with us:

Zoom Features



Zoom Chat

- Use the chat feature to interact with the presenter and respond to presenter's questions.
- Annotations are encouraged

SER 321
Protocol Tips

3-2 → Custom Protocol!

Stay Organized!

Try to emulate the structure in 3-1

Format your Markdown!

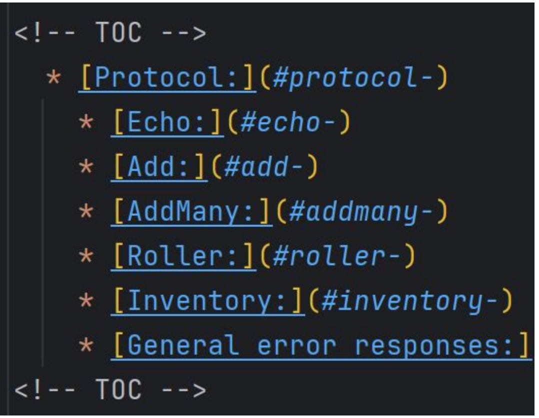
Assign 3-1 Starter Code

SER 321

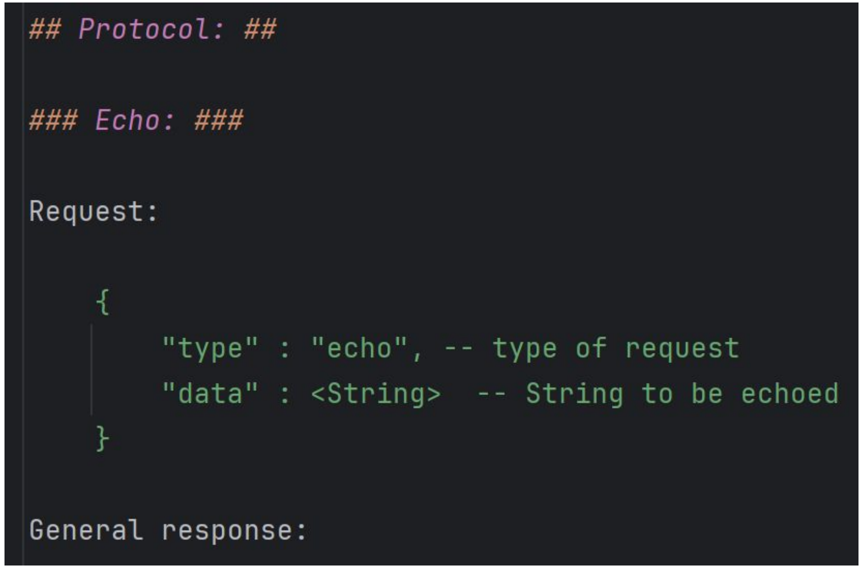
Protocol Tips

Table of Contents

Check out the recording for the discussion!



```
<!-- TOC -->
  * [Protocol:](#protocol-)
    * [Echo:](#echo-)
    * [Add:](#add-)
    * [AddMany:](#addmany-)
    * [Roller:](#roller-)
    * [Inventory:](#inventory-)
    * [General error responses:]
<!-- TOC -->
```



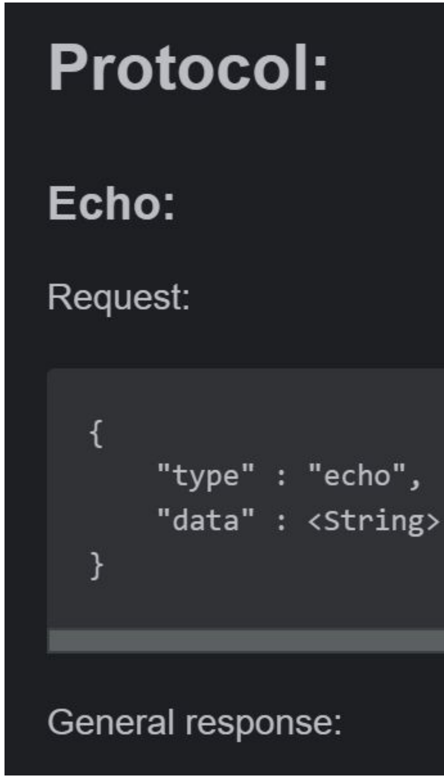
```
## Protocol: ##

### Echo: ###

Request:

    {
        "type" : "echo", -- type of request
        "data" : <String>  -- String to be echoed
    }

General response:
```



Protocol:

Echo:

Request:

```
{
    "type" : "echo",
    "data" : <String>
}
```

General response:

Assign 3-1 Starter Code

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Protocol Tips

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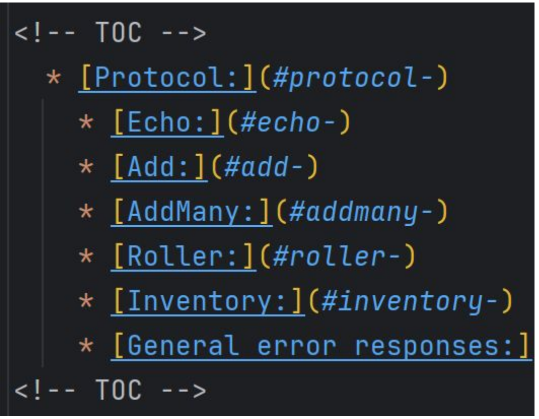

```
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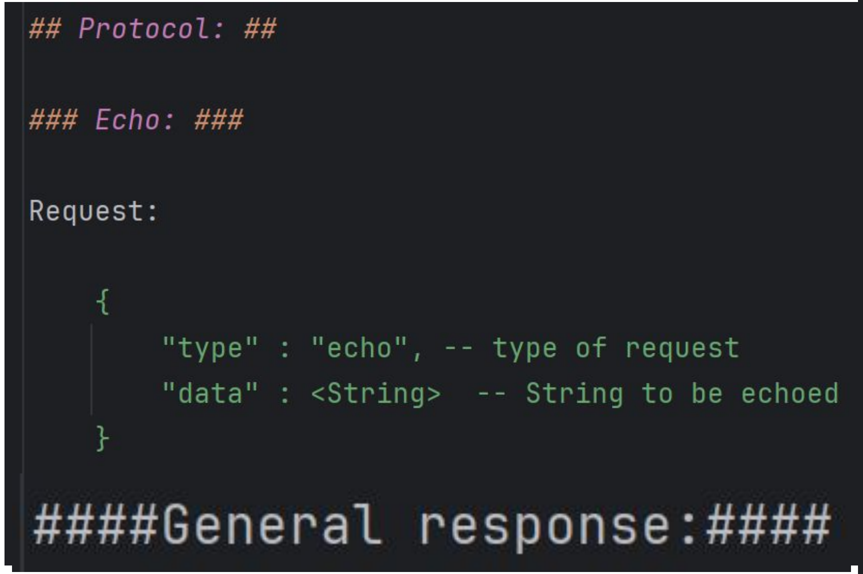


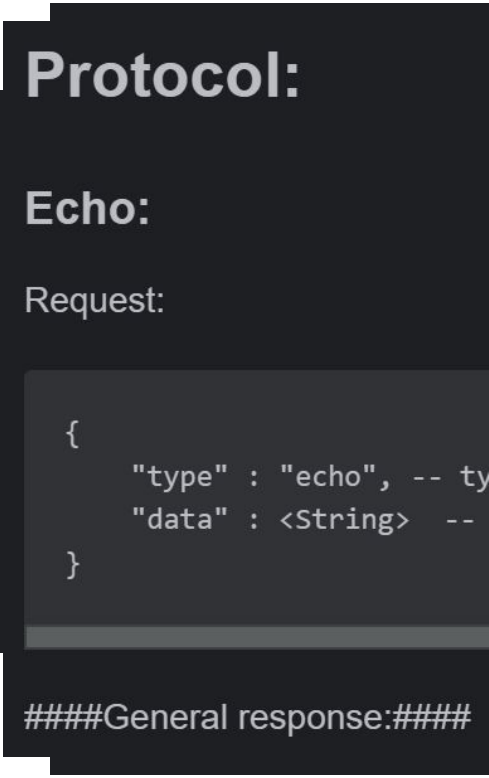
```
## Protocol: ##

### Echo: ###

Request:

    {
        "type" : "echo", -- type of request
        "data" : <String>  -- String to be echoed
    }

####General response:####
```



Protocol:

Echo:

Request:

```
{
    "type" : "echo", -- ty
    "data" : <String>  --
}
```

####General response:####

Spaces are important!

Assign 3-1 Starter Code

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Protocol Tips

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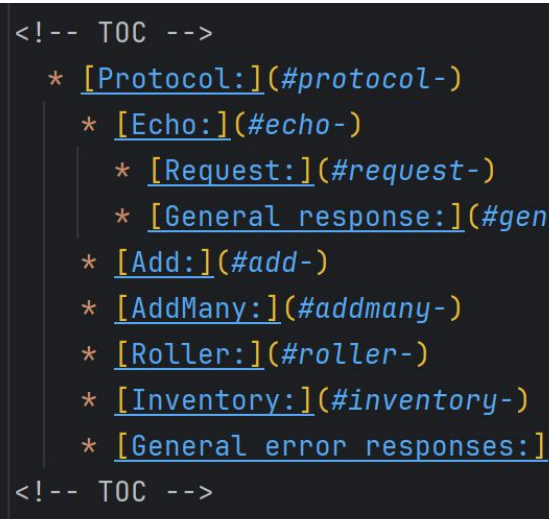

```
<!-- TOC -->
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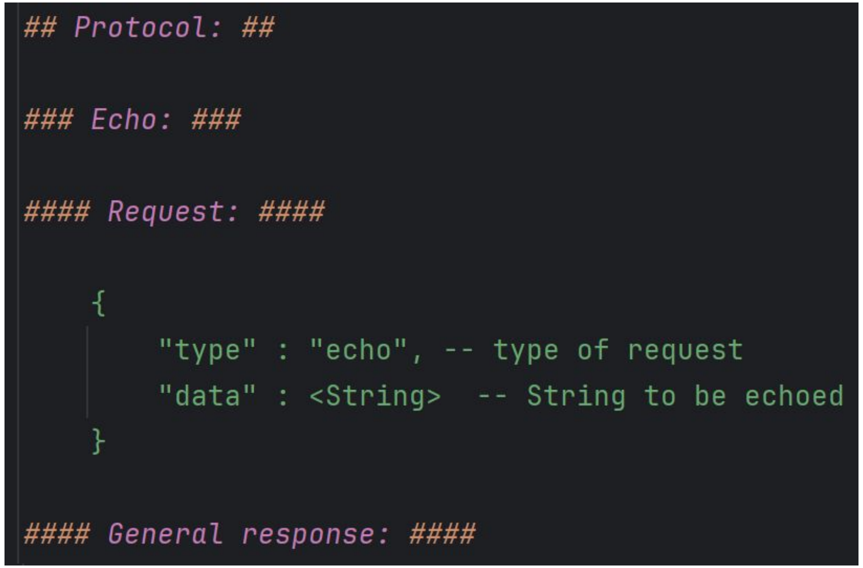


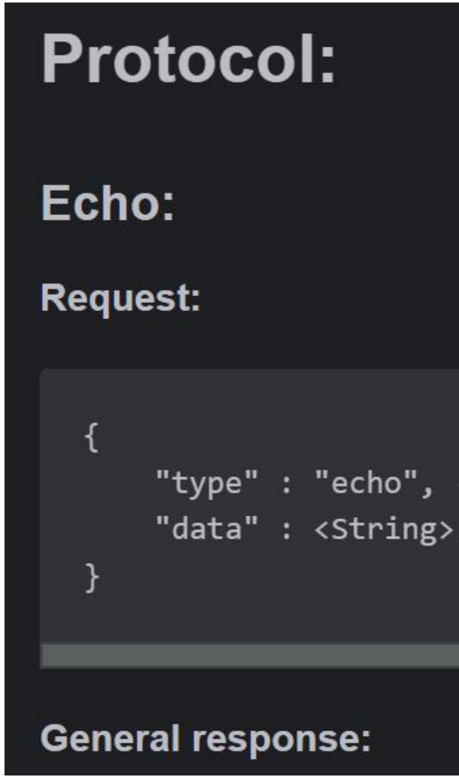
```
## Protocol: ##

### Echo: ###

#### Request: ####

    {
        "type" : "echo", -- type of request
        "data" : <String>  -- String to be echoed
    }

#### General response: ####
```



Protocol:

Echo:

Request:

```
{
    "type" : "echo",
    "data" : <String>
}
```

General response:

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Client Socket

Steps for the **Client Socket**

1.
2.
3.
4.
5.
6.
7.
8.

Check out the recording for the solution and discussion!

SER 321
Server Socket

Steps for the **Server Socket**

1.

2.

3.

4.

5.

6.

7.

8.

9.

Check out the recording for the solution and discussion!

SER 321
Server Socket

Java handles a few steps for us…

1. Define Params

2. Create Socket

3. **C ONLY** Create a struct for the address

3-5. Mark Socket to Listen

5. Mark Socket to Listen for Connections

6. Wait for Connection

7. Handle Client Connection

8. Close Client Connection

9. Continue Listening for Connections

Check out the recording for the solution and discussion!

Assign 3-1 Starter Code

SER 321
Server Socket

1. Define Params

2. Create Socket

3-5. Mark Socket to Listen

6. Wait for Connection

7. Handle Client Connection

8. Close Client Connection

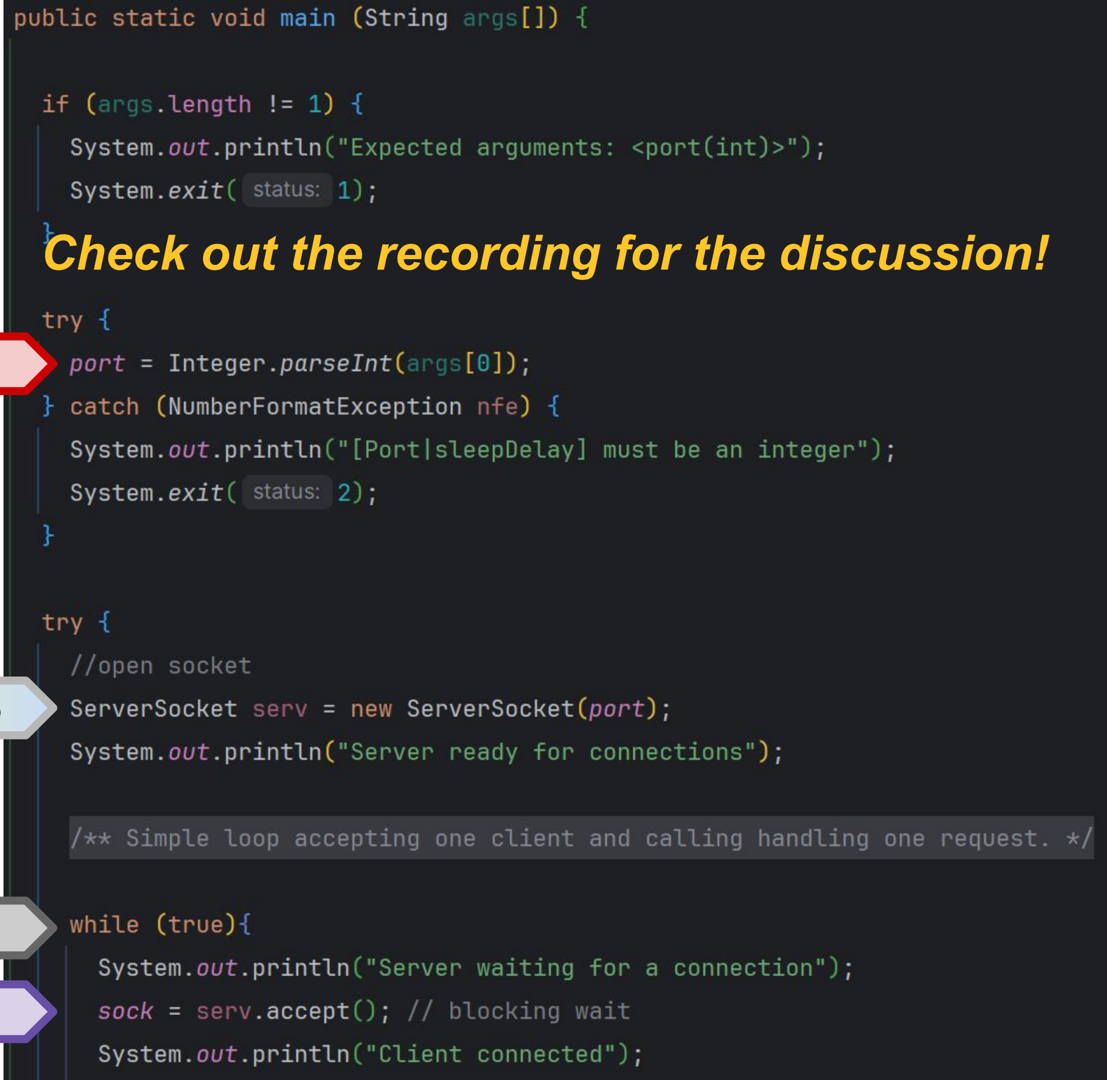
9. Continue Listening

1

2 & 3-5

9

6



```
public static void main (String args[]) {

  if (args.length != 1) {
    System.out.println("Expected arguments: <port(int)>");
    System.exit( status: 1);
  }

  try {
    port = Integer.parseInt(args[0]);
  } catch (NumberFormatException nfe) {
    System.out.println("[Port|sleepDelay] must be an integer");
    System.exit( status: 2);
  }

  try {
    //open socket
    ServerSocket serv = new ServerSocket(port);
    System.out.println("Server ready for connections");

    /** Simple loop accepting one client and calling handling one request. */

    while (true){
      System.out.println("Server waiting for a connection");
      sock = serv.accept(); // blocking wait
      System.out.println("Client connected");
```

Check out the recording for the discussion!

Assign 3-1 Starter Code

SER 321
Server Socket

What needs to be done here?

Check out the recording for the discussion!

1. Define Params
2. Create Socket
3-5. Mark Socket to Listen
6. Wait for Connection
7. **Handle Client Connection**
8. Close Client Connection
9. Continue Listening

1

2

3

4

5

Assign 3-1 Starter Code

Echo_Java

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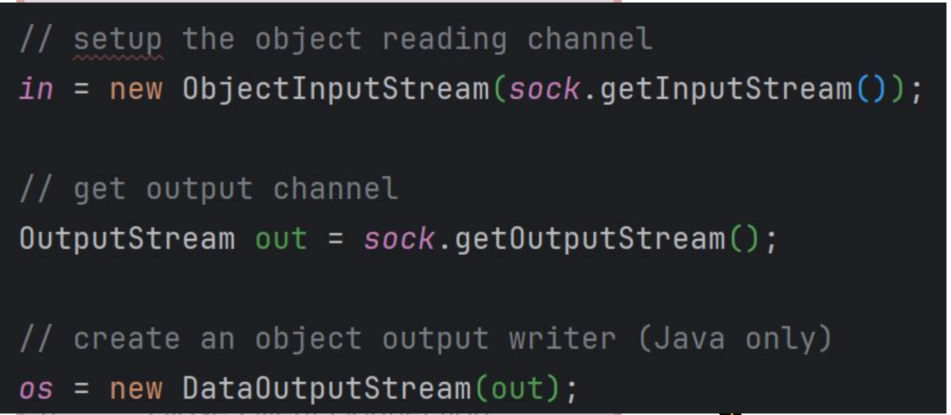
Server Socket

What needs to be done here?

Check out the recording for the discussion!

Is input
from the client
or
to the client ?

1. Define Params



```
// setup the object reading channel
in = new ObjectInputStream(sock.getInputStream());

// get output channel
OutputStream out = sock.getOutputStream();

// create an object output writer (Java only)
os = new DataOutputStream(out);
```

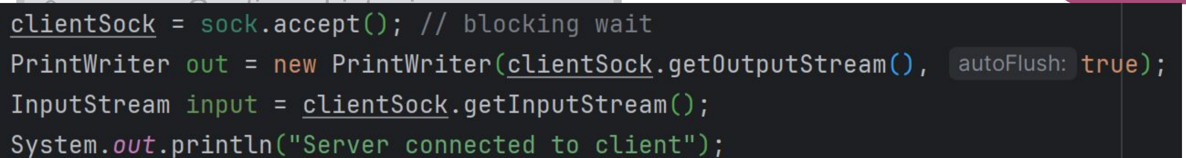
1

2

3

4

5

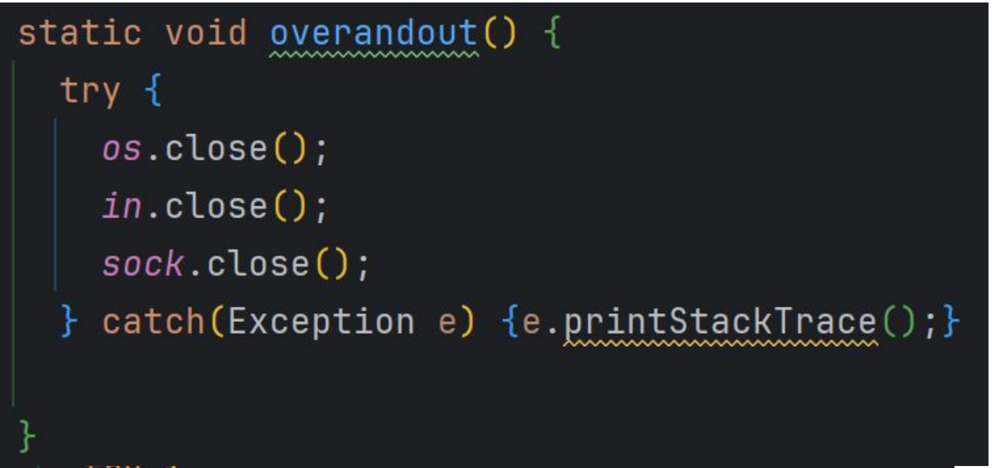


```
clientSock = sock.accept(); // blocking wait
PrintWriter out = new PrintWriter(clientSock.getOutputStream(), autoFlush: true);
InputStream input = clientSock.getInputStream();
System.out.println("Server connected to client");
```

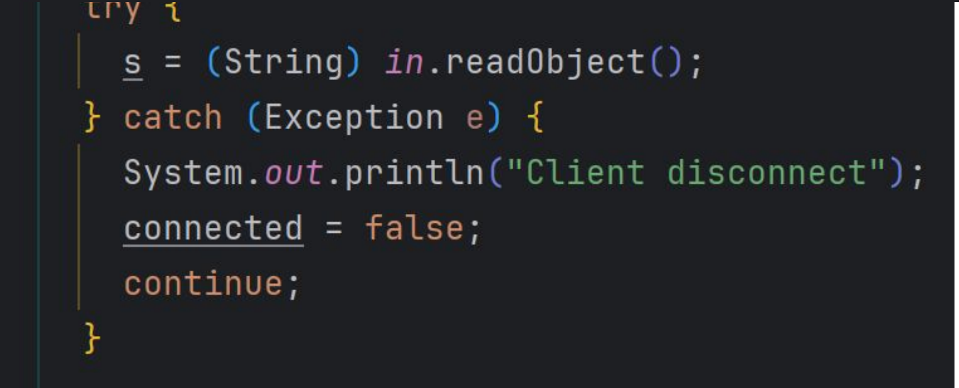
Assign 3-1 Starter Code ***Check out the recording for the discussion!***

SER 321
Server Socket

What needs to be done here?



```
static void overandout() {
  try {
    os.close();
    in.close();
    sock.close();
  } catch(Exception e) {e.printStackTrace();}

}
```



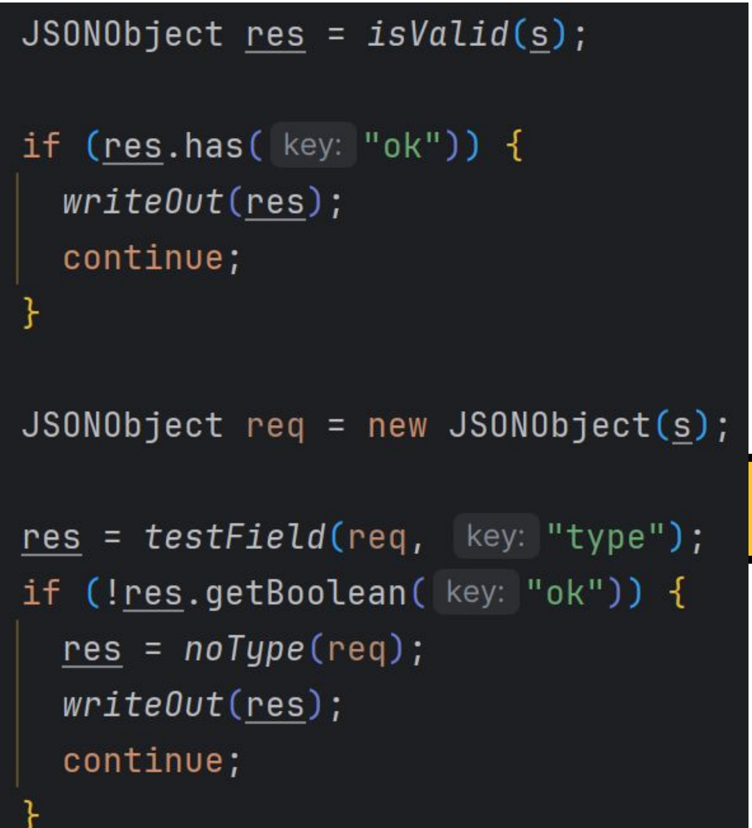
```
    s = (String) in.readObject();
  } catch (Exception e) {
    System.out.println("Client disconnect");
    connected = false;
    continue;
  }
```

1	Create input/output streams
2	
3	
4	
5	

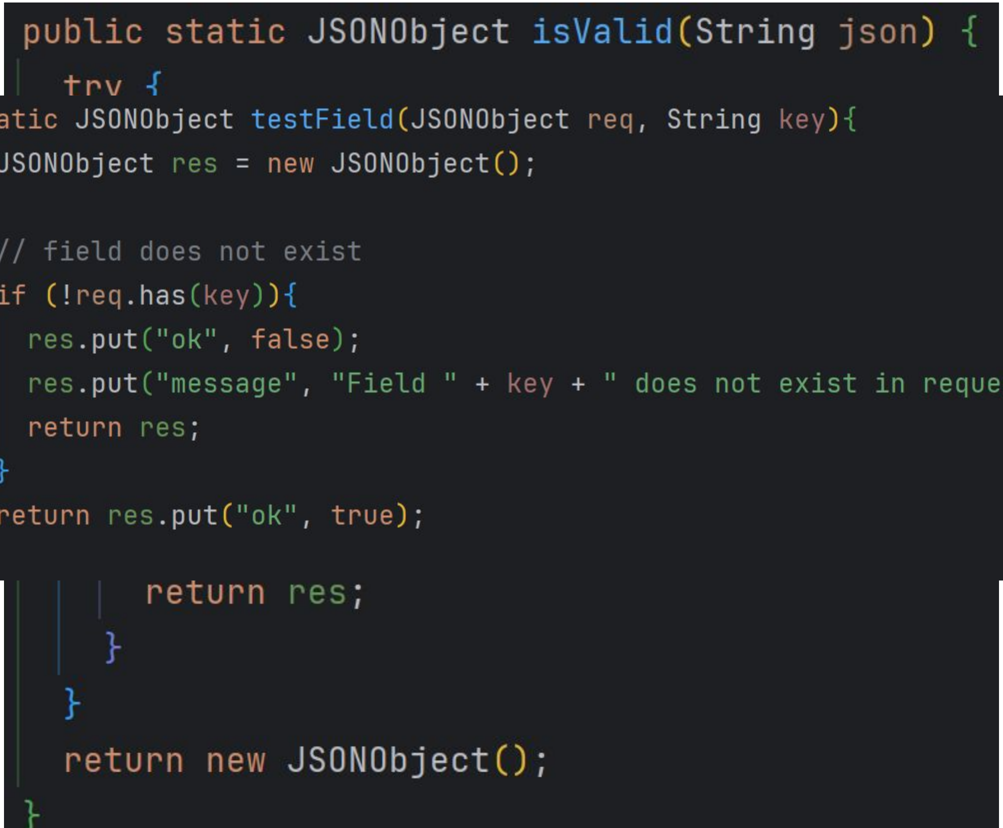
Assign 3-1 Starter Code **_Check out the recording for the discussion!_**

SER 321
Server Socket

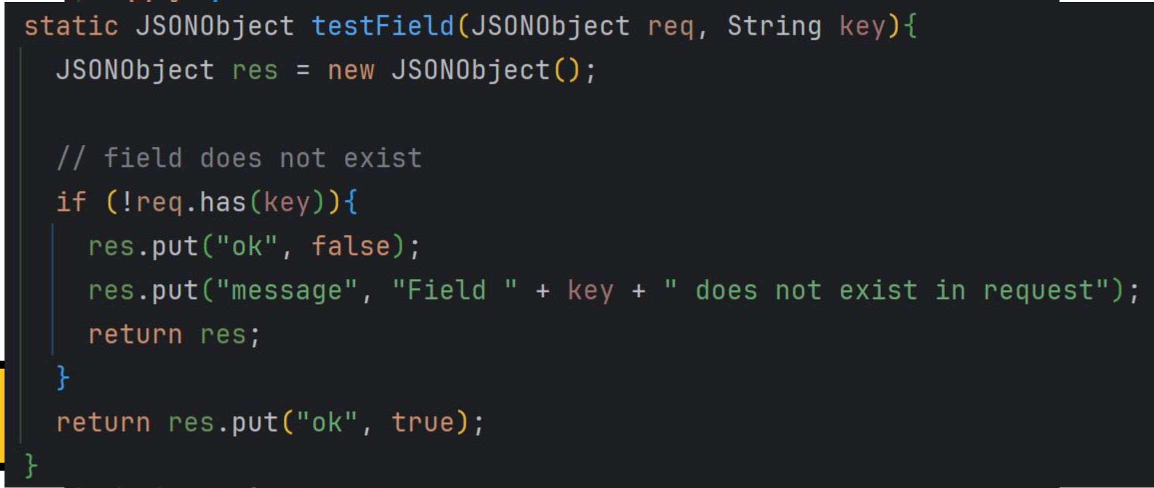
What needs to be done here?



```
JSONObject res = isValid(s);

if (res.has(key: "ok")) {
  writeOut(res);
  continue;
}

JSONObject req = new JSONObject(s);

res = testField(req, key: "type");
if (!res.getBoolean(key: "ok")) {
  res = noType(req);
  writeOut(res);
  continue;
}
```



```
public static JSONObject isValid(String json) {
  try {
```



```
static JSONObject testField(JSONObject req, String key){
  JSONObject res = new JSONObject();

  // field does not exist
  if (!req.has(key)){
    res.put("ok", false);
    res.put("message", "Field " + key + " does not exist in request");
    return res;
  }
  return res.put("ok", true);
}
```

```
        return res;
      }
    }
    return new JSONObject();
}
```

Assign 3-1 Starter Code

Echo_Java

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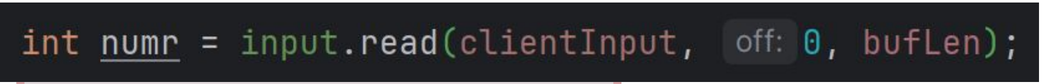
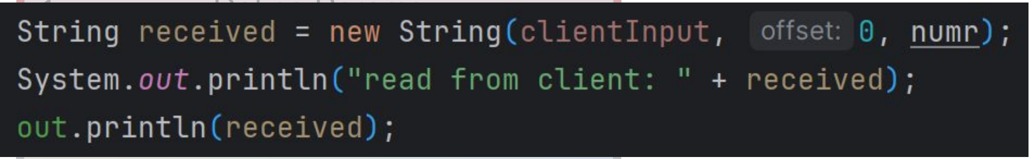
Server Socket

Check out the recording for the discussion!

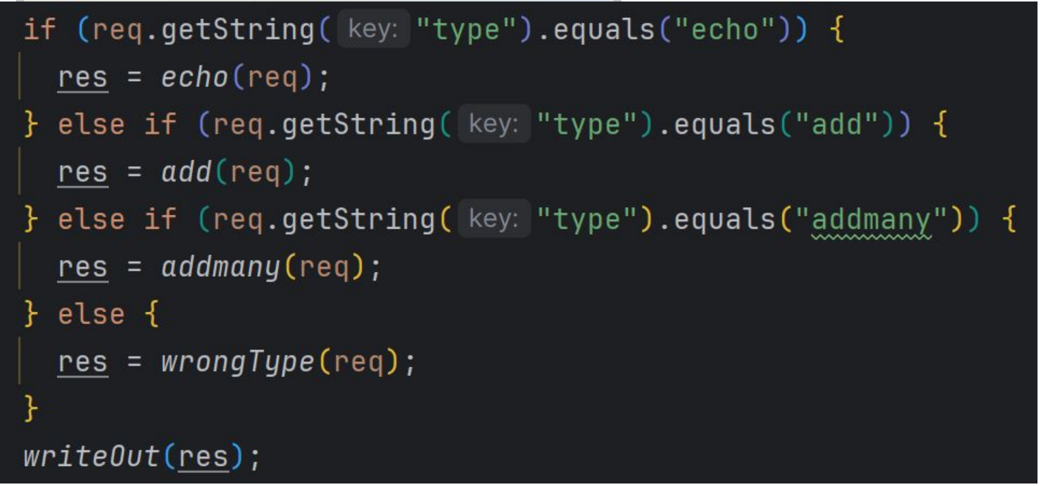
What needs to be done here?



```
int numr = input.read(clientInput, off: 0, bufLen);
```



```
String received = new String(clientInput, offset: 0, numr);
System.out.println("read from client: " + received);
out.println(received);
```



```
if (req.getString( key: "type").equals("echo")) {
  res = echo(req);
} else if (req.getString( key: "type").equals("add")) {
  res = add(req);
} else if (req.getString( key: "type").equals("addmany")) {
  res = addmany(req);
} else {
  res = wrongType(req);
}
writeOut(res);
```

1 Create input/output streams

2 Check for disconnect

3 Check Protocol

4

5

Assign 3-1 Starter Code ***Check out the recording for the discussion!***

SER 321

Server Socket

What needs to be done here?

1. Define Params
2. Create Socket
3-5. Mark Socket to Listen
6. Wait for Connection
7. Handle Client Connection
8. Close Client Connection
9. Continue Listening

1 Create input/output streams

2 Check for disconnect

3 Check Protocol

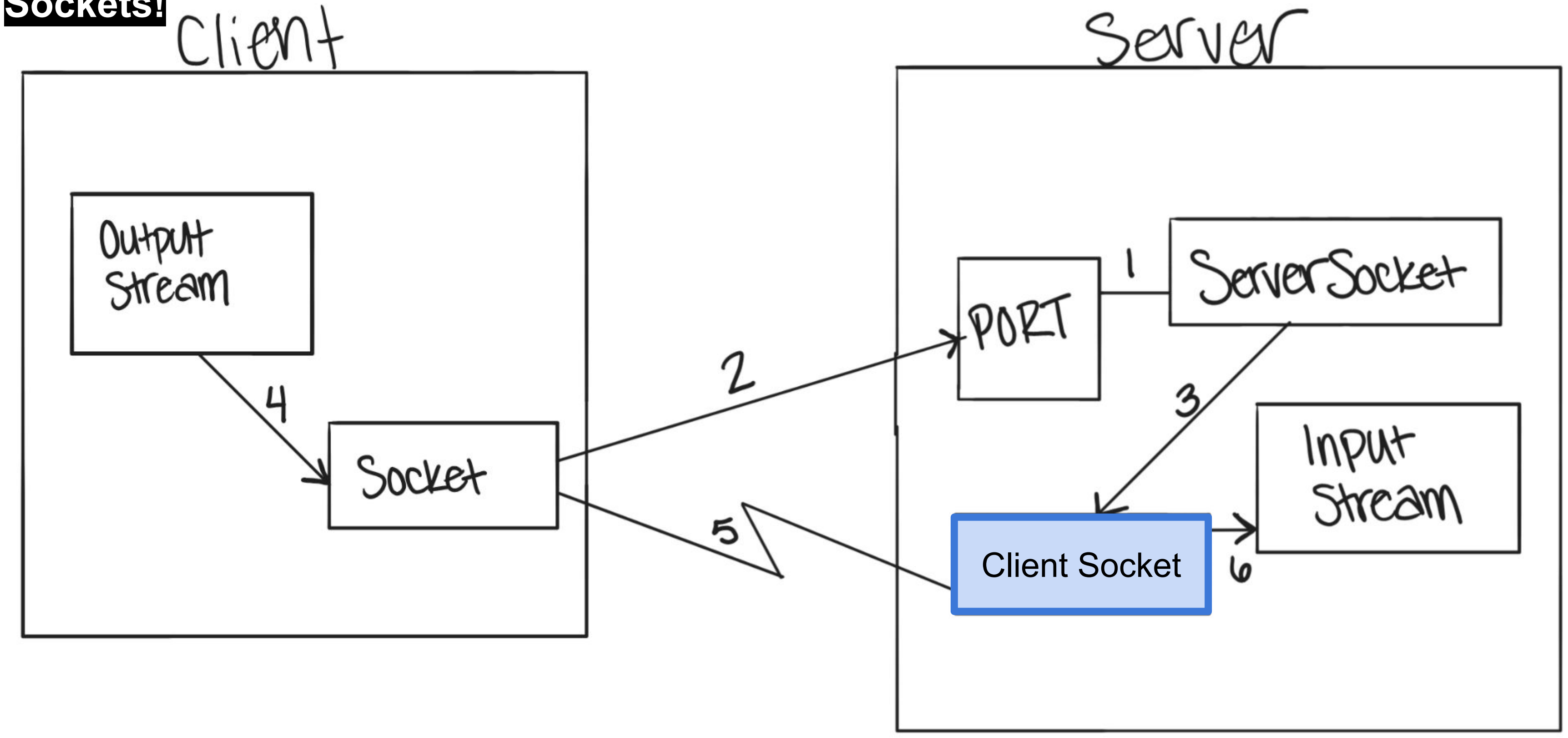
4 Read Headers

5 Handle Accordingly

Check out the recording for the discussion!

SER 321

Sockets!



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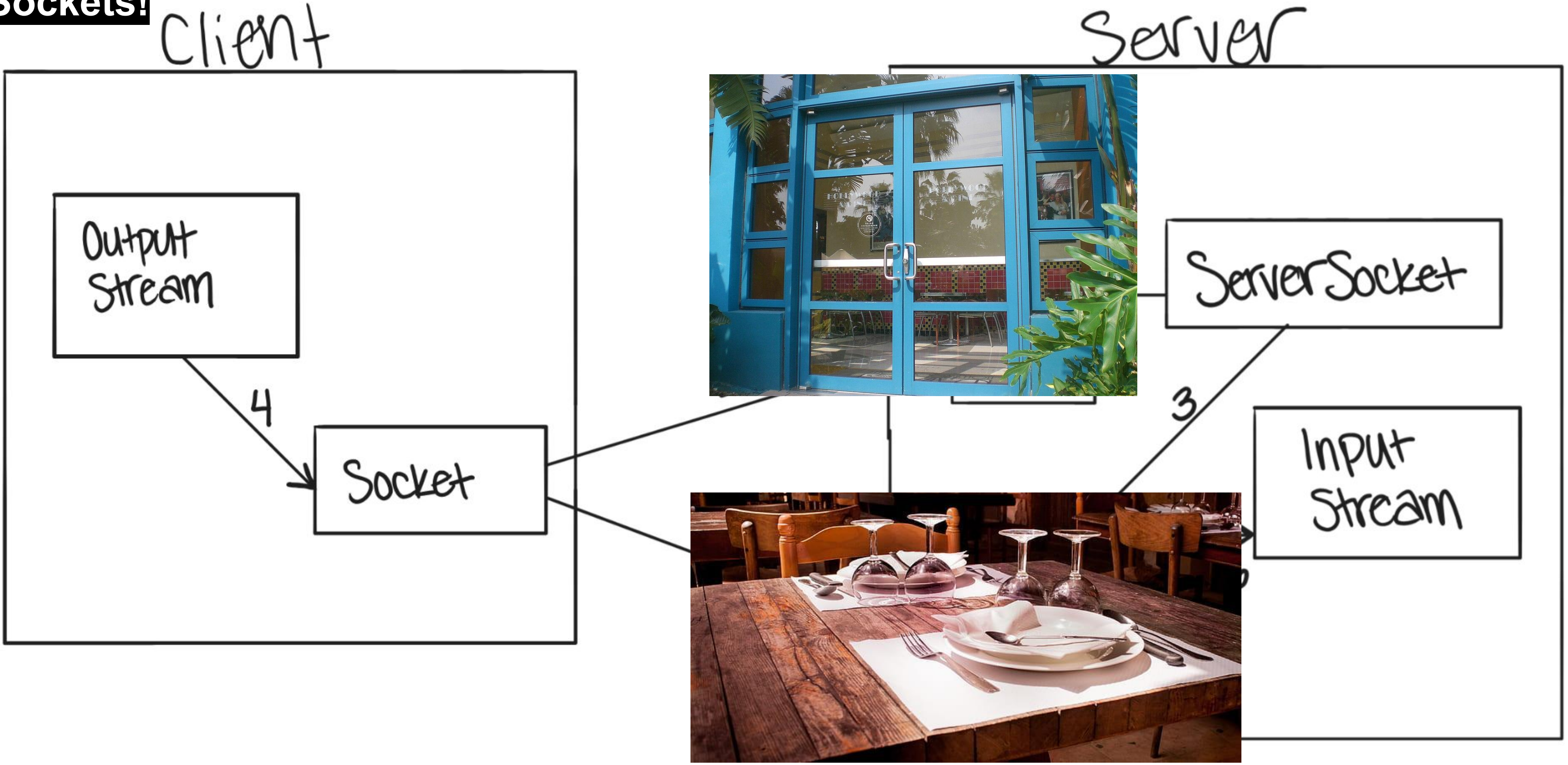
SER 321

Sockets!



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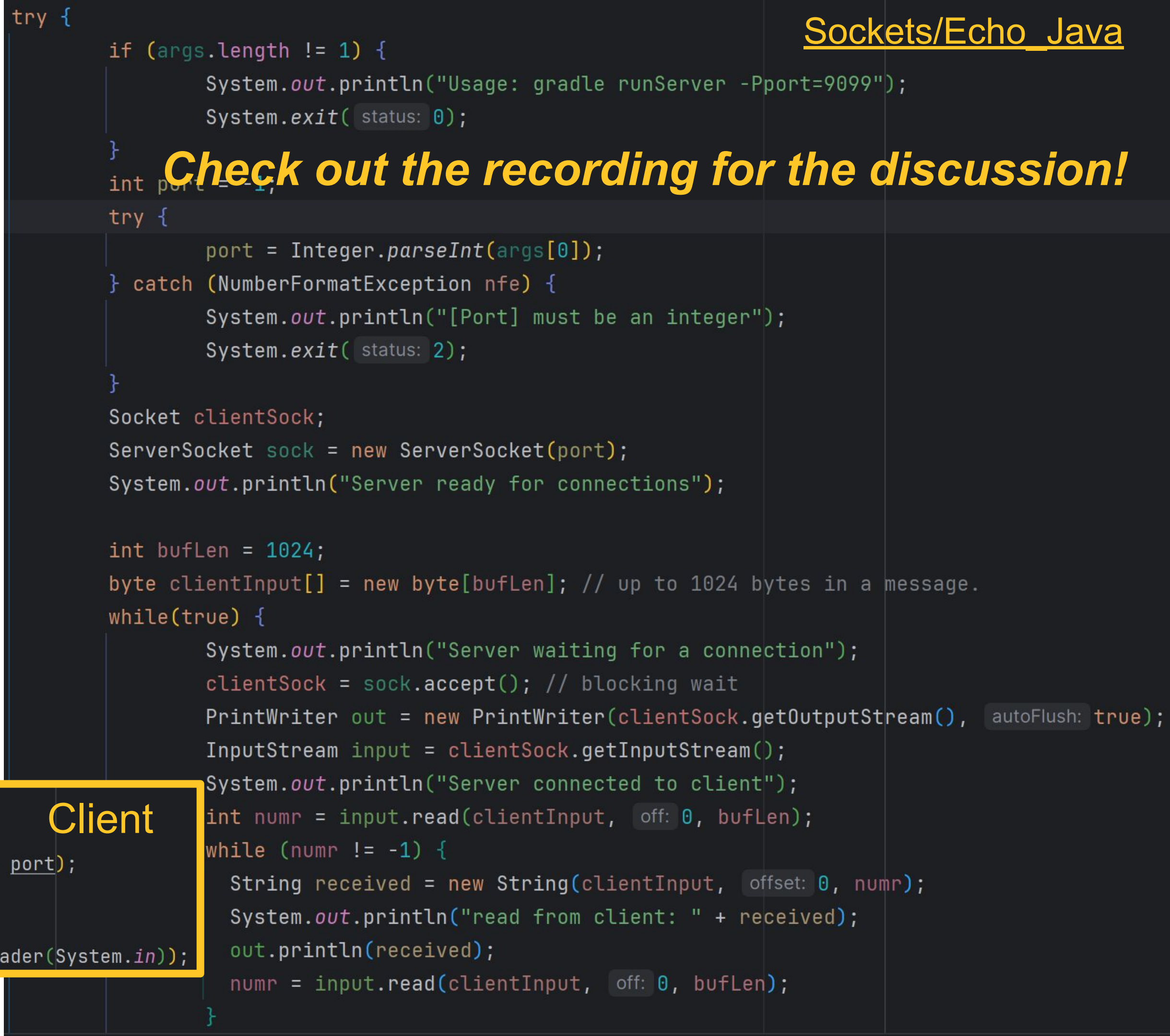
Sockets!

Original

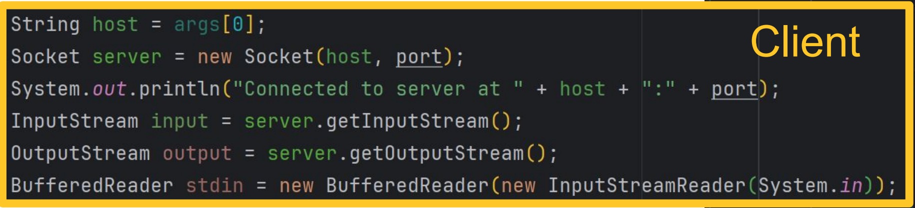
Sockets/Echo_Java

Check out the recording for the discussion!



```java
try {
        if (args.length != 1) {
                System.out.println("Usage: gradle runServer -Pport=9099");
                System.exit( status: 0);
        }
        int port = -1;
        try {
                port = Integer.parseInt(args[0]);
        } catch (NumberFormatException nfe) {
                System.out.println("[Port] must be an integer");
                System.exit( status: 2);
        }
        Socket clientSock;
        ServerSocket sock = new ServerSocket(port);
        System.out.println("Server ready for connections");

        int bufLen = 1024;
        byte clientInput[] = new byte[bufLen]; // up to 1024 bytes in a message.
        while(true) {
                System.out.println("Server waiting for a connection");
                clientSock = sock.accept(); // blocking wait
                PrintWriter out = new PrintWriter(clientSock.getOutputStream(), autoFlush: true);
                InputStream input = clientSock.getInputStream();
                System.out.println("Server connected to client");
                int numr = input.read(clientInput, off: 0, bufLen);
                while (numr != -1) {
                  String received = new String(clientInput, offset: 0, numr);
                  System.out.println("read from client: " + received);
                  out.println(received);
                  numr = input.read(clientInput, off: 0, bufLen);
                }
```



Client

```java
String host = args[0];
Socket server = new Socket(host, port);
System.out.println("Connected to server at " + host + ":" + port);
InputStream input = server.getInputStream();
OutputStream output = server.getOutputStream();
BufferedReader stdin = new BufferedReader(new InputStreamReader(System.in));
```

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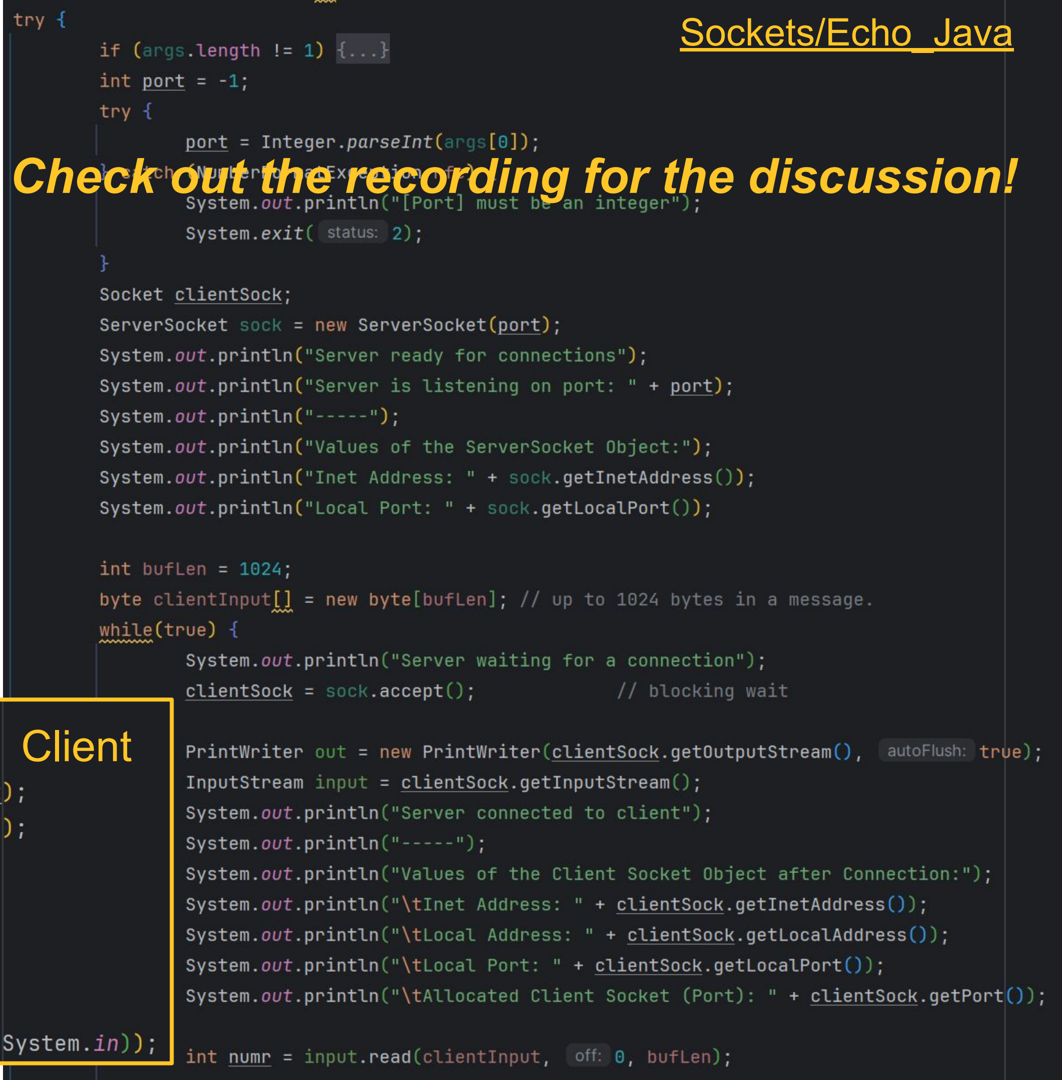
Sockets!

Modification

Sockets/Echo_Java



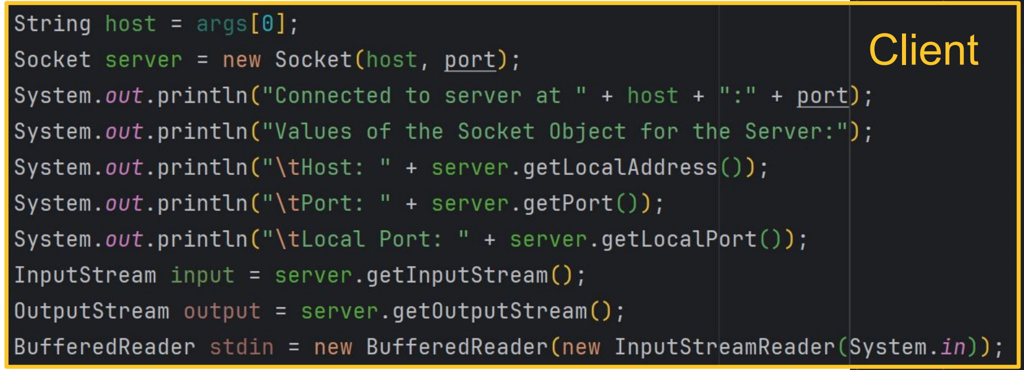
```
try {
        if (args.length != 1) {...}
        int port = -1;
        try {
                port = Integer.parseInt(args[0]);
        } catch (NumberFormatException nfe) {
                System.out.println("[Port] must be an integer");
                System.exit( status: 2);
        }
        Socket clientSock;
        ServerSocket sock = new ServerSocket(port);
        System.out.println("Server ready for connections");
        System.out.println("Server is listening on port: " + port);
        System.out.println("-----");
        System.out.println("Values of the ServerSocket Object:");
        System.out.println("Inet Address: " + sock.getInetAddress());
        System.out.println("Local Port: " + sock.getLocalPort());

        int bufLen = 1024;
        byte clientInput[] = new byte[bufLen]; // up to 1024 bytes in a message.
        while(true) {
                System.out.println("Server waiting for a connection");
                clientSock = sock.accept();              // blocking wait

                PrintWriter out = new PrintWriter(clientSock.getOutputStream(),  autoFlush: true);
                InputStream input = clientSock.getInputStream();
                System.out.println("Server connected to client");
                System.out.println("-----");
                System.out.println("Values of the Client Socket Object after Connection:");
                System.out.println("\tInet Address: " + clientSock.getInetAddress());
                System.out.println("\tLocal Address: " + clientSock.getLocalAddress());
                System.out.println("\tLocal Port: " + clientSock.getLocalPort());
                System.out.println("\tAllocated Client Socket (Port): " + clientSock.getPort());

                int numr = input.read(clientInput,  off: 0, bufLen);
```

Check out the recording for the discussion!



Client

```
String host = args[0];
Socket server = new Socket(host, port);
System.out.println("Connected to server at " + host + ":" + port);
System.out.println("Values of the Socket Object for the Server:");
System.out.println("\tHost: " + server.getLocalAddress());
System.out.println("\tPort: " + server.getPort());
System.out.println("\tLocal Port: " + server.getLocalPort());
InputStream input = server.getInputStream();
OutputStream output = server.getOutputStream();
BufferedReader stdin = new BufferedReader(new InputStreamReader(System.in));
```

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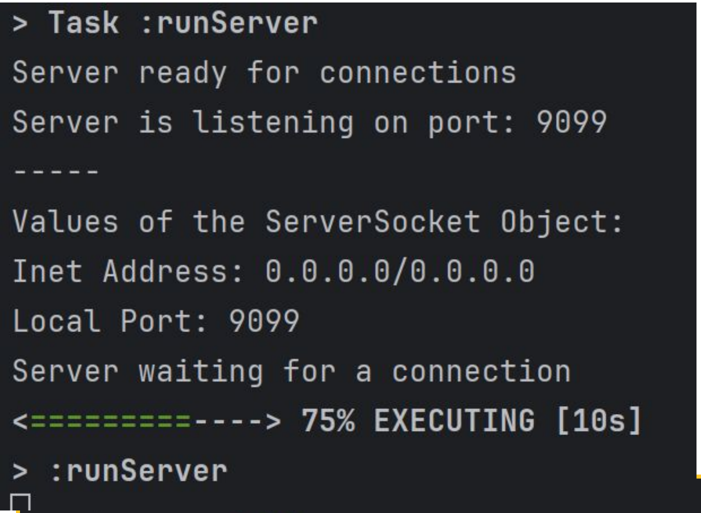
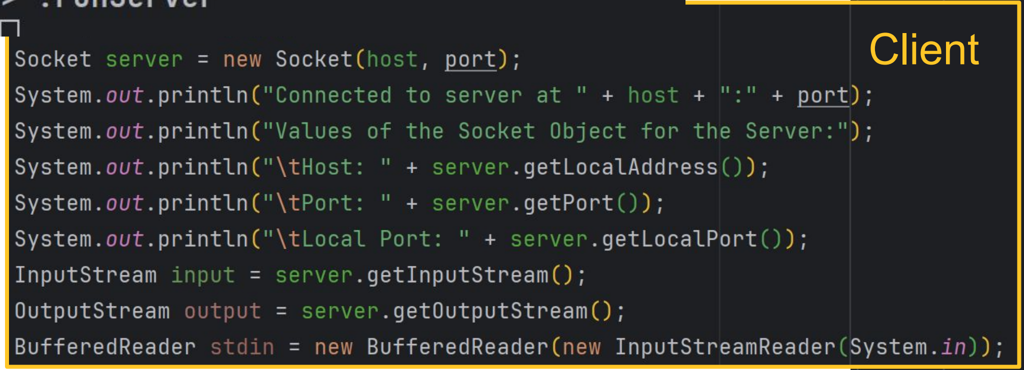
Sockets!



```
> Task :runServer
Server ready for connections
Server is listening on port: 9099
-----
Values of the ServerSocket Object:
Inet Address: 0.0.0.0/0.0.0.0
Local Port: 9099
Server waiting for a connection
<=========----> 75% EXECUTING [10s]
> :runServer
```

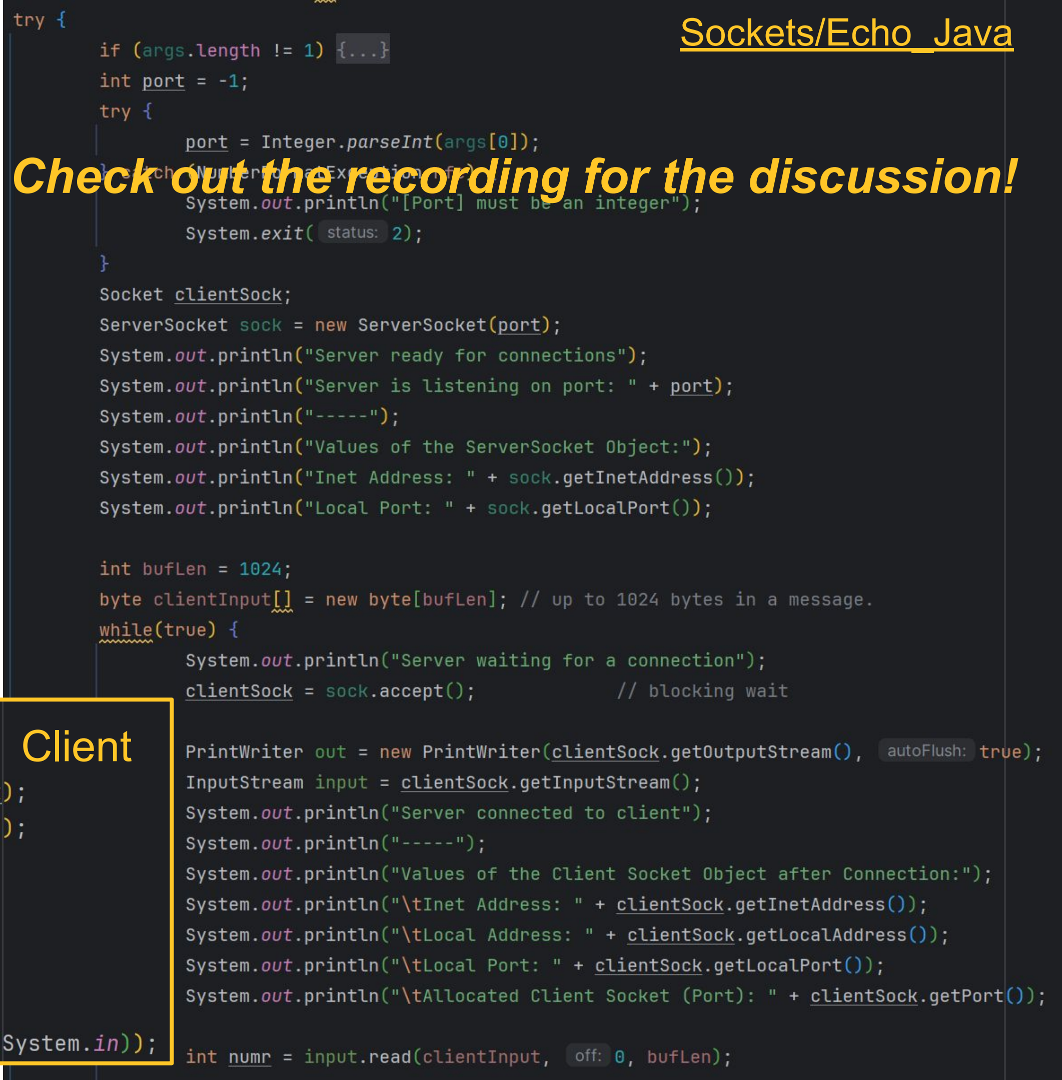
Client



```java
Socket server = new Socket(host, port);
System.out.println("Connected to server at " + host + ":" + port);
System.out.println("Values of the Socket Object for the Server:");
System.out.println("\tHost: " + server.getLocalAddress());
System.out.println("\tPort: " + server.getPort());
System.out.println("\tLocal Port: " + server.getLocalPort());
InputStream input = server.getInputStream();
OutputStream output = server.getOutputStream();
BufferedReader stdin = new BufferedReader(new InputStreamReader(System.in));
```

Sockets/Echo_Java

Check out the recording for the discussion!



```java
try {
        if (args.length != 1) {...}
        int port = -1;
        try {
                port = Integer.parseInt(args[0]);
        } catch (NumberFormatException nfe) {
                System.out.println("[Port] must be an integer");
                System.exit( status: 2);
        }
        Socket clientSock;
        ServerSocket sock = new ServerSocket(port);
        System.out.println("Server ready for connections");
        System.out.println("Server is listening on port: " + port);
        System.out.println("-----");
        System.out.println("Values of the ServerSocket Object:");
        System.out.println("Inet Address: " + sock.getInetAddress());
        System.out.println("Local Port: " + sock.getLocalPort());

        int bufLen = 1024;
        byte clientInput[] = new byte[bufLen]; // up to 1024 bytes in a message.
        while(true) {
                System.out.println("Server waiting for a connection");
                clientSock = sock.accept();             // blocking wait

                PrintWriter out = new PrintWriter(clientSock.getOutputStream(),  autoFlush: true);
                InputStream input = clientSock.getInputStream();
                System.out.println("Server connected to client");
                System.out.println("-----");
                System.out.println("Values of the Client Socket Object after Connection:");
                System.out.println("\tInet Address: " + clientSock.getInetAddress());
                System.out.println("\tLocal Address: " + clientSock.getLocalAddress());
                System.out.println("\tLocal Port: " + clientSock.getLocalPort());
                System.out.println("\tAllocated Client Socket (Port): " + clientSock.getPort());

                int numr = input.read(clientInput,  off: 0, bufLen);
```

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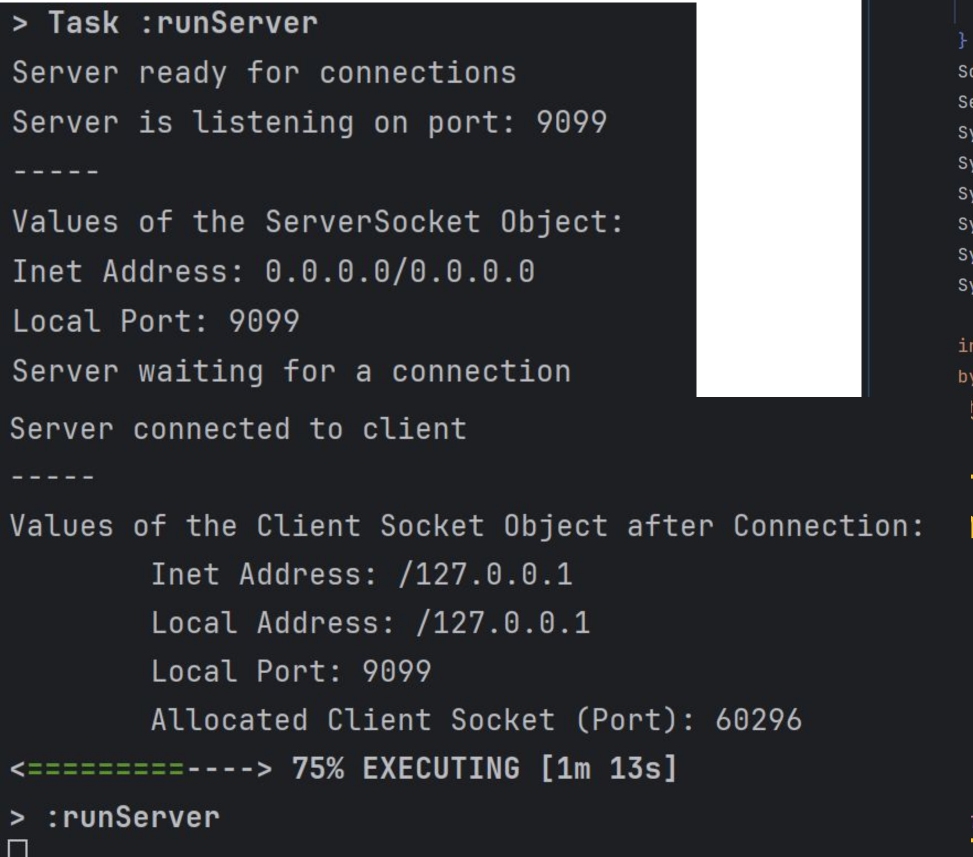
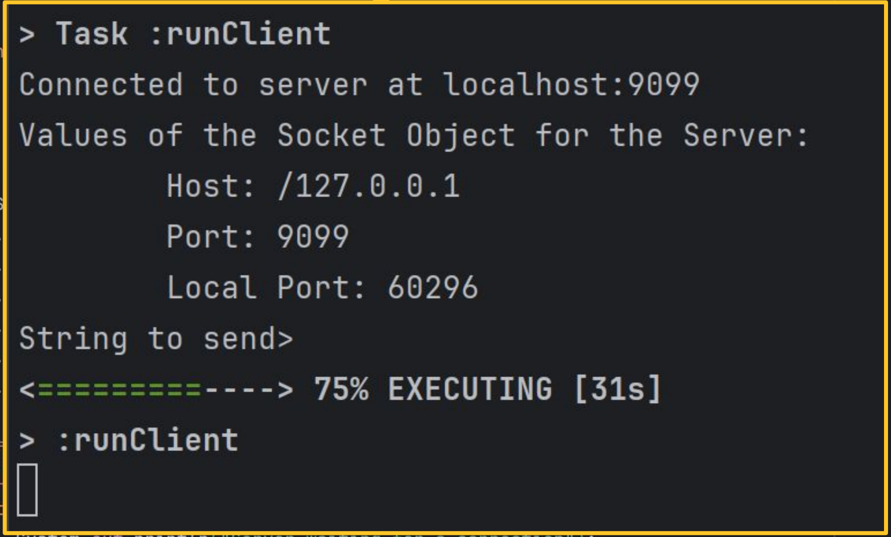
Sockets!

Sockets/Echo_Java

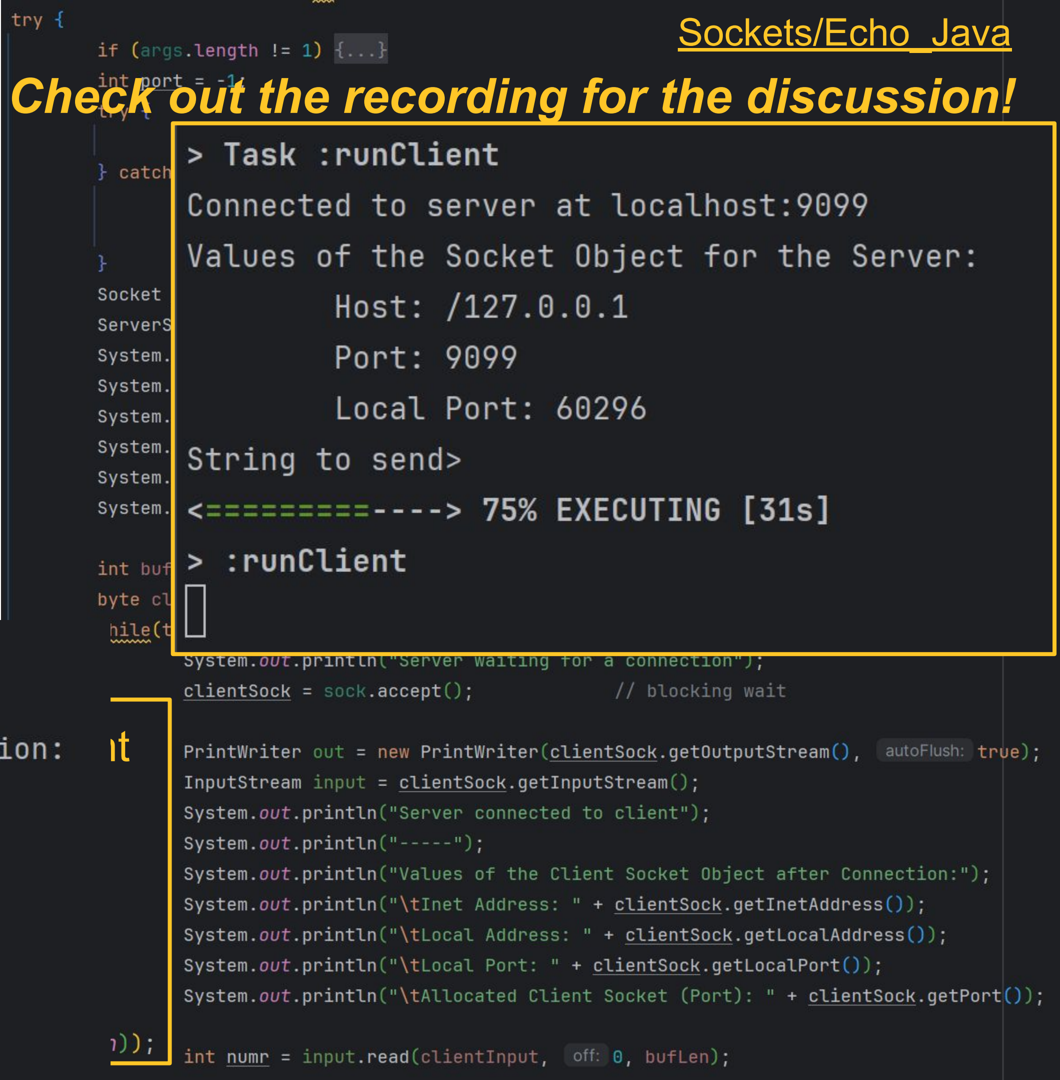
Check out the recording for the discussion!



```
> Task :runServer
Server ready for connections
Server is listening on port: 9099
-----
Values of the ServerSocket Object:
Inet Address: 0.0.0.0/0.0.0.0
Local Port: 9099
Server waiting for a connection
Server connected to client
-----
Values of the Client Socket Object after Connection:
        Inet Address: /127.0.0.1
        Local Address: /127.0.0.1
        Local Port: 9099
        Allocated Client Socket (Port): 60296
<=========----> 75% EXECUTING [1m 13s]
> :runServer
```



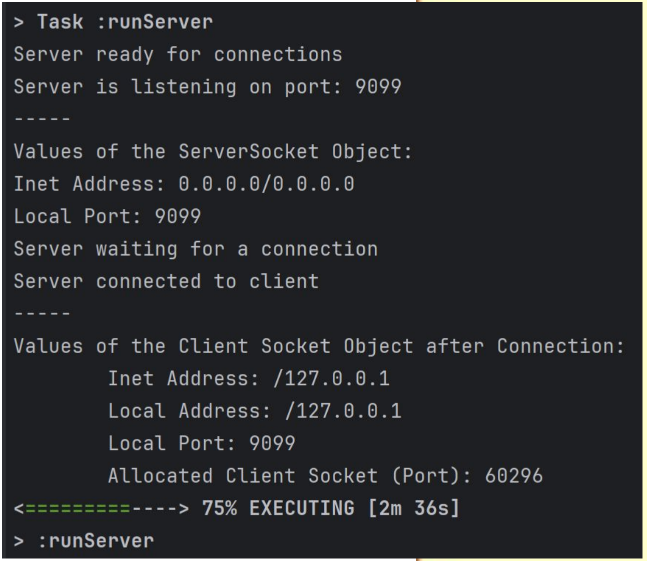
```
> Task :runClient
Connected to server at localhost:9099
Values of the Socket Object for the Server:
        Host: /127.0.0.1
        Port: 9099
        Local Port: 60296
String to send>
<=========----> 75% EXECUTING [31s]
> :runClient
```



```
try {
        if (args.length != 1) {...}
        int port = -1;
        try {

        } catch

        }
        Socket
        ServerS
        System.
        System.
        System.
        System.
        System.
        System.

        int buf
        byte cl
        hile(t
            System.out.println("Server waiting for a connection");
            clientSock = sock.accept();              // blocking wait

            PrintWriter out = new PrintWriter(clientSock.getOutputStream(), autoFlush: true);
            InputStream input = clientSock.getInputStream();
            System.out.println("Server connected to client");
            System.out.println("-----");
            System.out.println("Values of the Client Socket Object after Connection:");
            System.out.println("\tInet Address: " + clientSock.getInetAddress());
            System.out.println("\tLocal Address: " + clientSock.getLocalAddress());
            System.out.println("\tLocal Port: " + clientSock.getLocalPort());
            System.out.println("\tAllocated Client Socket (Port): " + clientSock.getPort());

            int numr = input.read(clientInput, off: 0, bufLen);
```

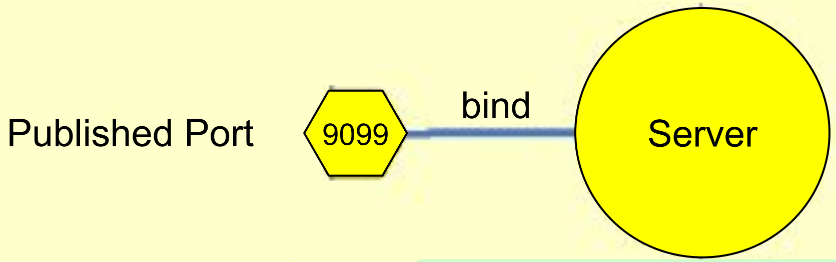
SER 321

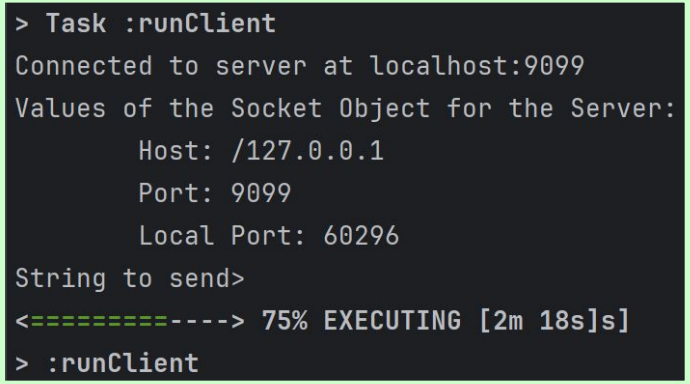
Sockets!



```
> Task :runServer
Server ready for connections
Server is listening on port: 9099
-----
Values of the ServerSocket Object:
Inet Address: 0.0.0.0/0.0.0.0
Local Port: 9099
Server waiting for a connection
Server connected to client
-----
Values of the Client Socket Object after Connection:
        Inet Address: /127.0.0.1
        Local Address: /127.0.0.1
        Local Port: 9099
        Allocated Client Socket (Port): 60296
<=========----> 75% EXECUTING [2m 36s]
> :runServer
```

Check out the recording for the discussion!

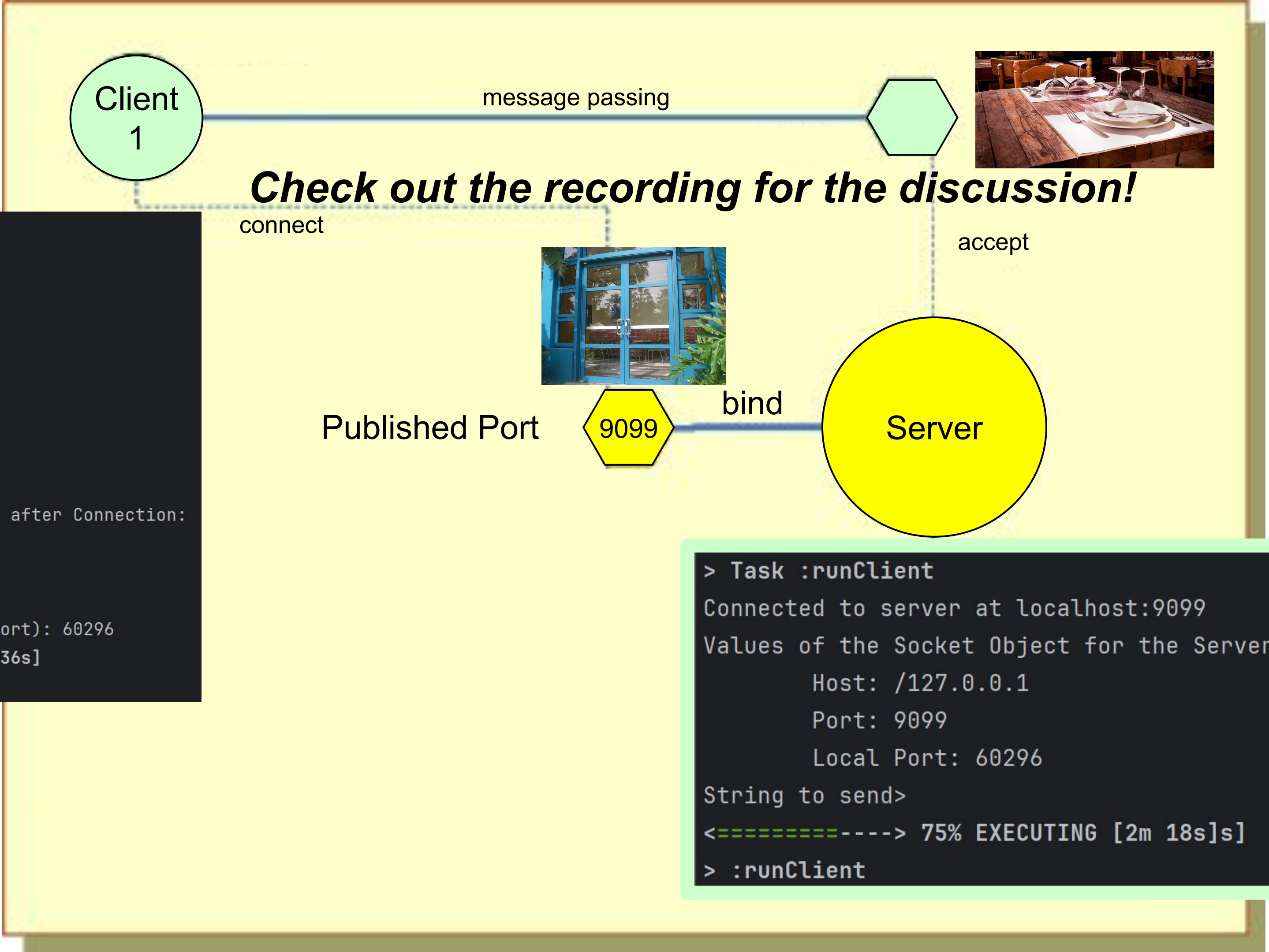




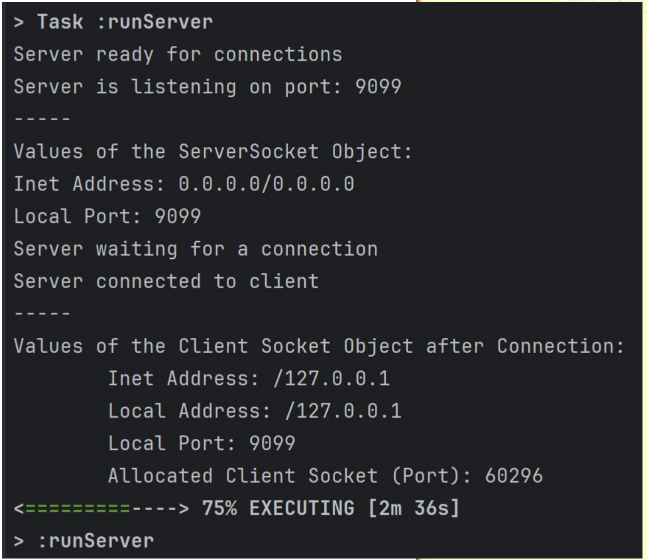
```
> Task :runClient
Connected to server at localhost:9099
Values of the Socket Object for the Server:
        Host: /127.0.0.1
        Port: 9099
        Local Port: 60296
String to send>
<=========----> 75% EXECUTING [2m 18s]s]
> :runClient
```

Design of an RFID Vehicle Authentication System: A Case Study for Al-Nahrain University Campus - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Client-and-Server-Socket-Ports_fig4_282671198

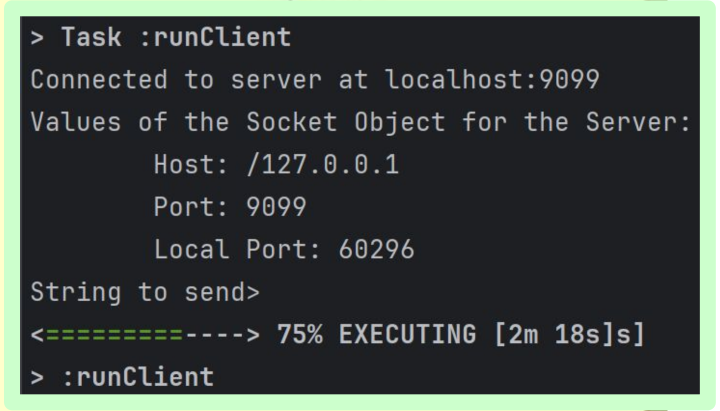
SER 321
Sockets!



Check out the recording for the discussion!



```
> Task :runServer
Server ready for connections
Server is listening on port: 9099
-----
Values of the ServerSocket Object:
Inet Address: 0.0.0.0/0.0.0.0
Local Port: 9099
Server waiting for a connection
Server connected to client
-----
Values of the Client Socket Object after Connection:
        Inet Address: /127.0.0.1
        Local Address: /127.0.0.1
        Local Port: 9099
        Allocated Client Socket (Port): 60296
<=========----> 75% EXECUTING [2m 36s]
> :runServer
```



```
> Task :runClient
Connected to server at localhost:9099
Values of the Socket Object for the Server:
        Host: /127.0.0.1
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        Local Port: 60296
String to send>
<=========----> 75% EXECUTING [2m 18s]s]
> :runClient
```
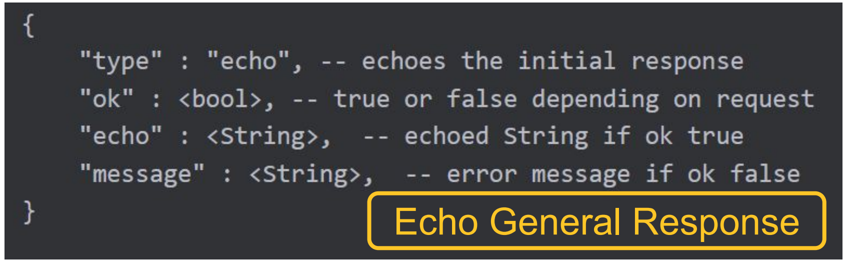

Design of an RFID Vehicle Authentication System: A Case Study for Al-Nahrain University Campus - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Client-and-Server-Socket-Ports_fig4_282671198

Assign 3-1 Starter Code

SER 321
JSON

Which of the following would be a valid response?



```
{
    "type" : "echo", -- echoes the initial response
    "ok" : <bool>, -- true or false depending on request
    "echo" : <String>,  -- echoed String if ok true
    "message" : <String>,  -- error message if ok false
}
```

Echo General Response

A.
```
{
    “type” : “echo”,
    “echo” : <String>
}
```

C.
```
{
    “type” : “echo”,
    “message” : <String>
}
```

Check out the recording for the solution!

B.
```
{
    “type” : “echo”,
    “ok” : false,
    “echo” : <String>
}
```

D.
```
{
    “type” : “echo”,
    “ok” : true,
    “echo” : <String>
}
```

SER 321

Scratch Space

Upcoming Events

SI Sessions:

- Sunday, February 2nd at 7:00 pm MST
- Tuesday, February 4th at 11:00 am MST
- Thursday, February 6th at 7:00 pm MST

Review Sessions:

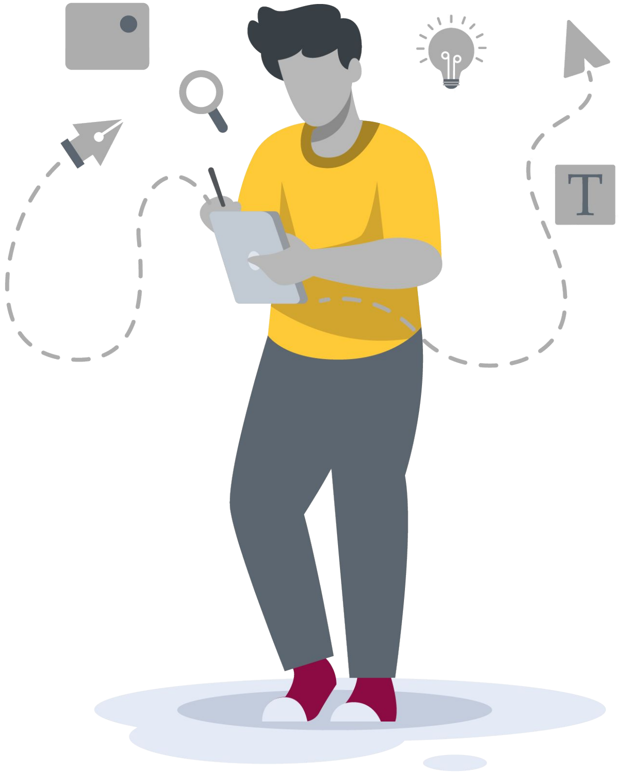
- Tuesday, February 25th at 11:00 am MST - **Q&A Session**
- Thursday, February 27th at 7:00 pm MST - **Exam Review Session (2hrs)**

Questions?

Survey:

https://asuasn.info/ASNSurvey

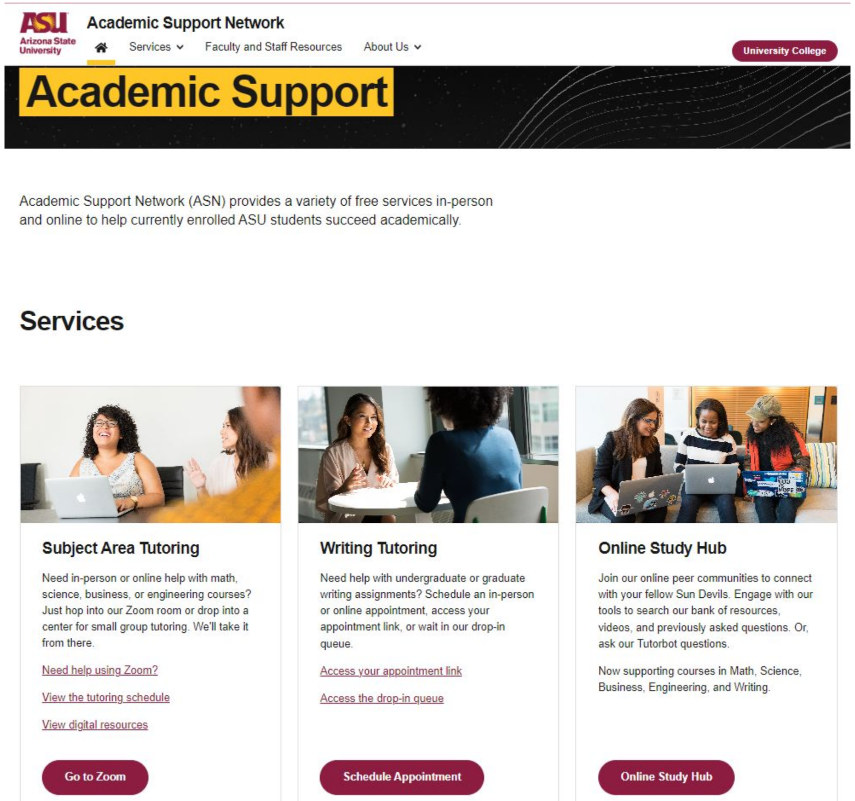
bitly



More Questions?

Check out our other resources!

tutoring.asu.edu



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View the tutoring schedule

View digital resources

Go to Zoom

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Need help with undergraduate or graduate writing assignments? Schedule an in-person or online appointment, access your appointment link, or wait in our drop-in queue.

Access your appointment link

Access the drop-in queue

Schedule Appointment

Online Study Hub

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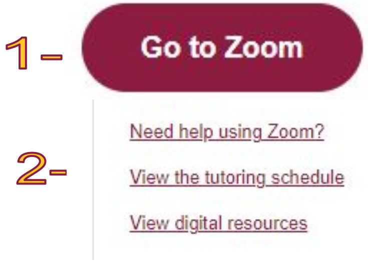
Online Study Hub

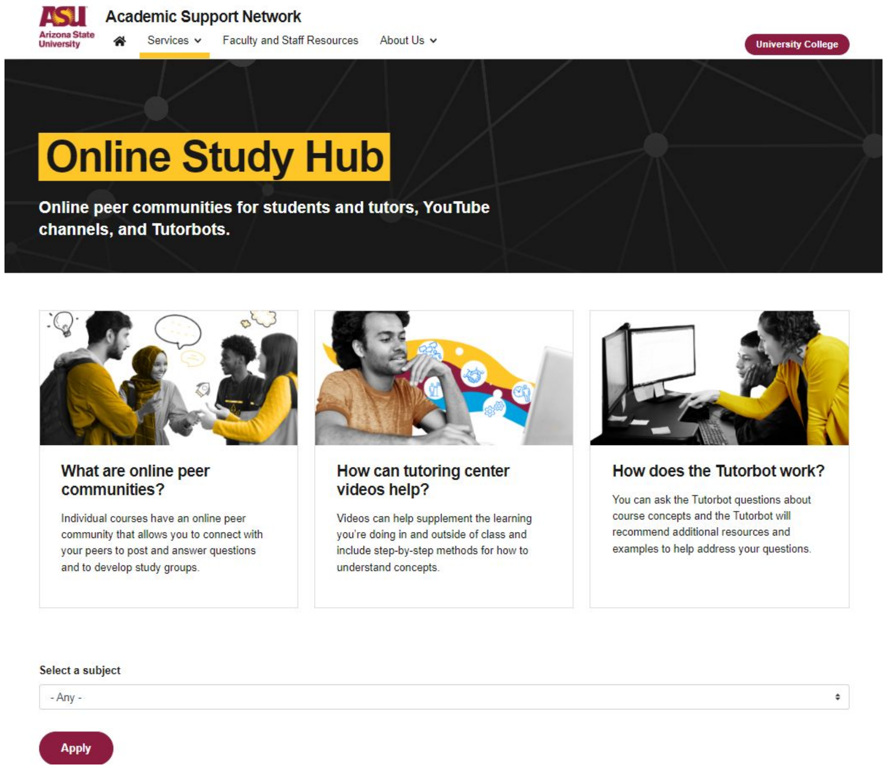


1. Click on 'Go to Zoom' to log onto our Online Tutoring Center.
2. Click on 'View the tutoring schedule' to see when tutors are available for specific courses.

More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub



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Individual courses have an online peer community that allows you to connect with your peers to post and answer questions and to develop study groups.

How can tutoring center videos help?

Videos can help supplement the learning you're doing in and outside of class and include step-by-step methods for how to understand concepts.

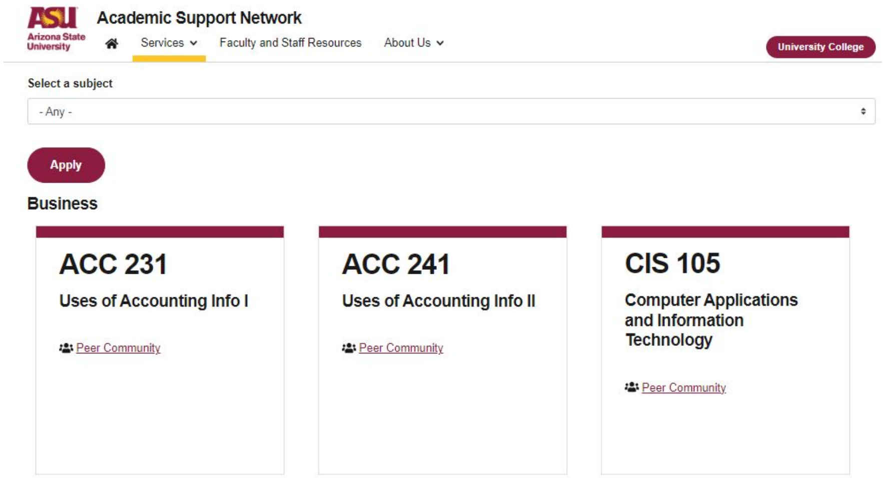
How does the Tutorbot work?

You can ask the Tutorbot questions about course concepts and the Tutorbot will recommend additional resources and examples to help address your questions.

Select a subject

- Any -

Apply



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- Any -

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Peer Community

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Computer Applications and Information Technology
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Don’t forget to check out the Online Study Hub for additional resources!

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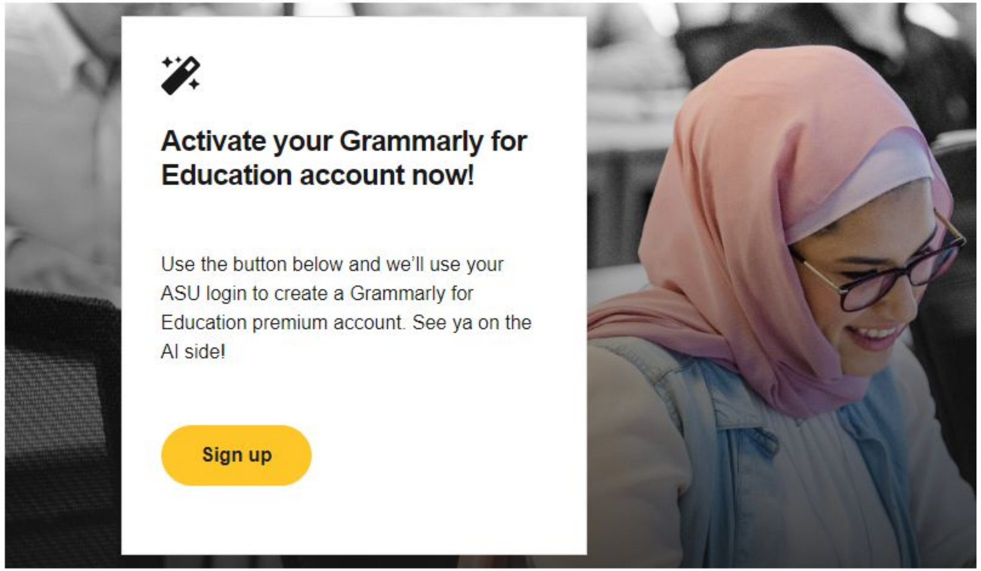

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tutoring.asu.edu/expanded-writing-support

*Available slots for this pilot are limited

Additional Resources

- Course Repo
- Gradle Documentation
- GitHub SSH Help
- Linux Man Pages
- OSI Interactive
- MDN HTTP Docs
  - Requests
  - Responses
- JSON Guide
- org.json Docs
- javax.swing package API
- Swing Tutorials