

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

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Protocol Tips

3-2 → Custom Protocol!

Stay Organized!

Try to emulate the structure in 3-1

Format your Markdown!

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Protocol Tips

Table of Contents

```
<!-- 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:

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Protocol Tips

Table of Contents

```
<!-- TOC -->
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* [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", -- ty
  "data" : <String> --
}
```

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

Spaces are important!

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Protocol Tips

Table of Contents

```
<!-- TOC -->
* [Protocol:](#protocol-)
* [Echo:](#echo-)
  * [Request:](#request-)
  * [General response:](#gen
* [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:

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Client Socket

Steps for the **Client Socket**

1.

2.

3.

4.

5.

6.

7.

8.

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Server Socket

Steps for the **Server Socket**

1.

2.

3.

4.

5.

6.

7.

8.

9.

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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

Assign 3-1 Starter Code

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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");
```

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Server Socket

What needs to be done here?

1. Define Params

2. Create Socket

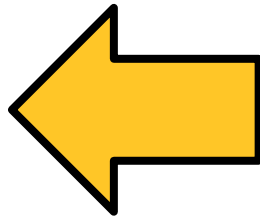
3-5. Mark Socket to Listen

6. Wait for Connection

7. Handle Client Connection

8. Close Client Connection

9. Continue Listening



1

2

3

4

5

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Server Socket

What needs to be done here?

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");
```

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Server Socket

What needs to be done here?

```
static void overandout() {  
    try {  
        os.close();  
        in.close();  
        sock.close();  
    } catch (Exception e) {e.printStackTrace();}  
}  
  
try {  
    s = (String) in.readObject();  
} catch (Exception e) {  
    System.out.println("Client disconnect");  
    connected = false;  
    continue;  
}
```

1 Create input/output streams

2

3

4

5

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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();
}
```


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Server Socket

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

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Server Socket

What needs to be done here?

1. Define Params

2. Create Socket

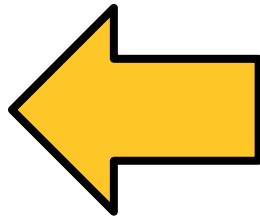
3-5. Mark Socket to Listen

6. Wait for Connection

7. Handle Client Connection

8. Close Client Connection

9. Continue Listening



1 Create input/output streams

2 Check for disconnect

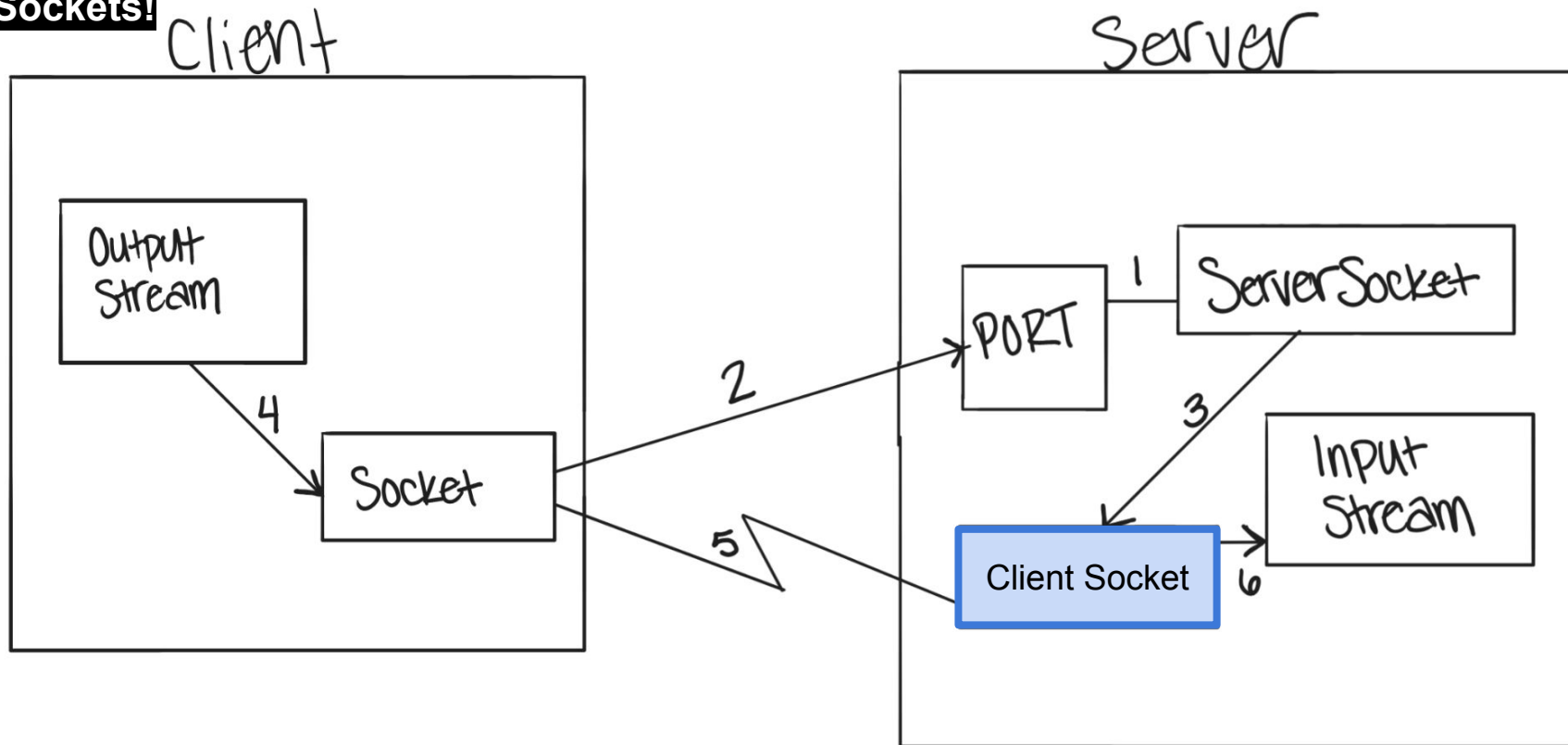
3 Check Protocol

4 Read Headers

5 Handle Accordingly

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Sockets!

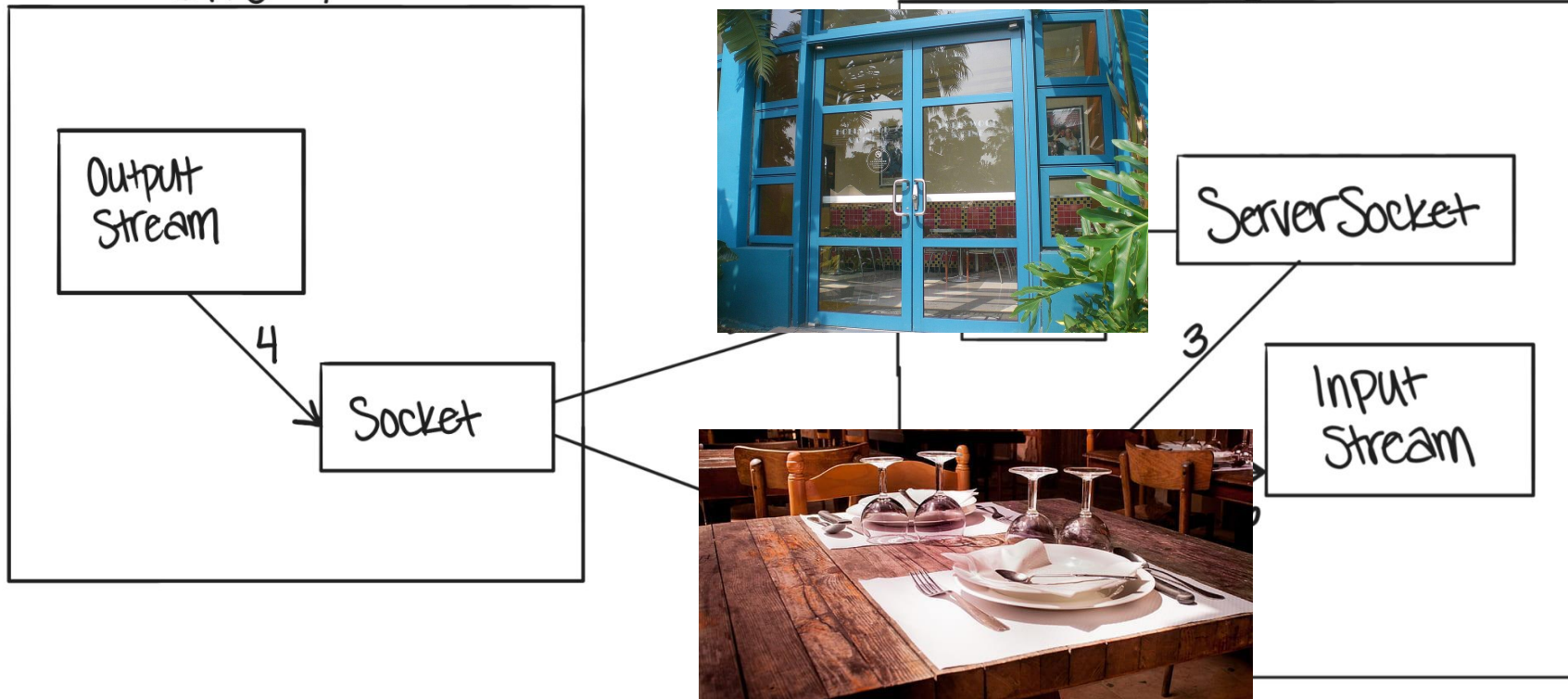


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Sockets!

Client

Server



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Sockets!

Original

```
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));
```

Client

Sockets/Echo 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);
        }
    }
}
```

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Sockets!

Modification

```
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));
```

Client

```
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);
```

Sockets/Echo Java

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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
```

```
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));
```

Client

```
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!

```
> 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
```

Sockets/Echo Java

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

```
> 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
```

```
int buf
byte cl
while(t
```

```
System.out.println("Server waiting for a connection");
clientSock = sock.accept(); // blocking wait
```

```
it
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());
```

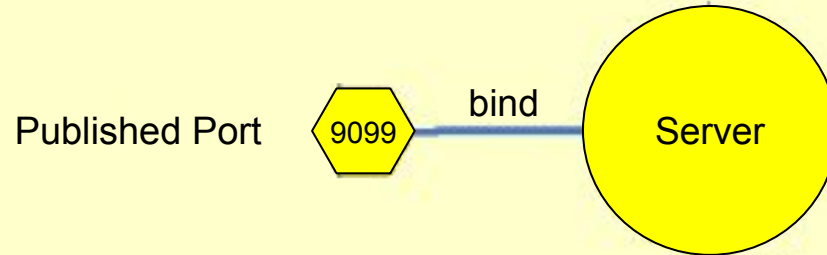
```
));
```

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


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Sockets!

```
> 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
```

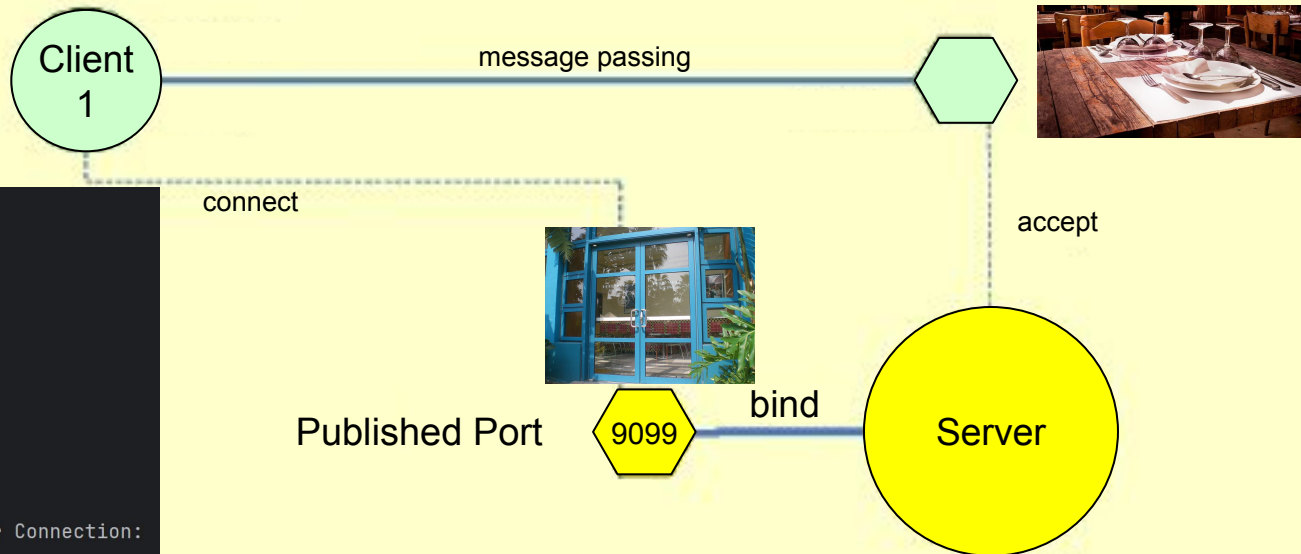


```
> Task :runClient
Connected to server at localhost:9099
Values of the Socket Object for the Server:
    Host: /127.0.0.1
    Port: 9099
    Local Port: 60296
String to send>
<=====--> 75% EXECUTING [2m 18s]s]
> :runClient
```

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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
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
Port: 9099
Local Port: 60296
String to send>
<=====--> 75% EXECUTING [2m 18s]s]
> :runClient
```

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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>
}

B. {
 "type" : "echo",
 "ok" : false,
 "echo" : <String>
}

D. {
 "type" : "echo",
 "ok" : true,
 "echo" : <String>
}

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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

Why are the others invalid?

A. {
 "type" : "echo",
 "echo" : <String>
}

C. {
 "type" : "echo",
 "message" : <String>
}

B. {
 "type" : "echo",
 "ok" : false,
 "echo" : <String>
}

D. {
 "type" : "echo",
 "ok" : true,
 "echo" : <String>
}

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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",
 "ok" : false,
 "echo" : <String>
}

B. {
 "type" : "echo",
 "ok" : false,
 "message" : <String>
}

C. {
 "type" : "echo",
 "ok" : false
}

D. {
 "type" : "echo",
 "ok" : true,
 "message" : <String>
}

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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

Why are the others invalid?

A. {
 "type" : "echo",
 "ok" : false,
 "echo" : <String>
}

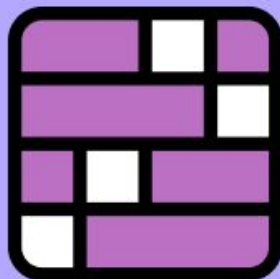
C. {
 "type" : "echo",
 "ok" : false
}

B. {
 "type" : "echo",
 "ok" : false,
 "message" : <String>
}

D. {
 "type" : "echo",
 "ok" : true,
 "message" : <String>
}

Connections!

The New York Times **Games**



Connections

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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>



More Questions?

Check out our other resources!

tutoring.asu.edu



Academic Support

Academic Support Network (ASN) provides a variety of free services in-person and online to help currently enrolled ASU students succeed academically.

Services



Subject Area Tutoring

Need in-person or online help with math, science, business, or engineering courses? Just hop into our Zoom room or drop into a center for small group tutoring. We'll take it from there.

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Go to Zoom



Writing Tutoring

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.

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[Access the drop-in queue](#)

Schedule Appointment



Online Study Hub

Join our online peer communities to connect with your fellow Sun Devils. Engage with our tools to search our bank of resources, videos, and previously asked questions. Or, ask our Tutorbot questions.

Now supporting courses in Math, Science, Business, Engineering, and Writing.

Online Study Hub

1-

Go to Zoom

2-

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[View digital resources](#)



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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Online Study Hub

Online peer communities for students and tutors, YouTube channels, and Tutorbots.



What are online peer communities?

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 -

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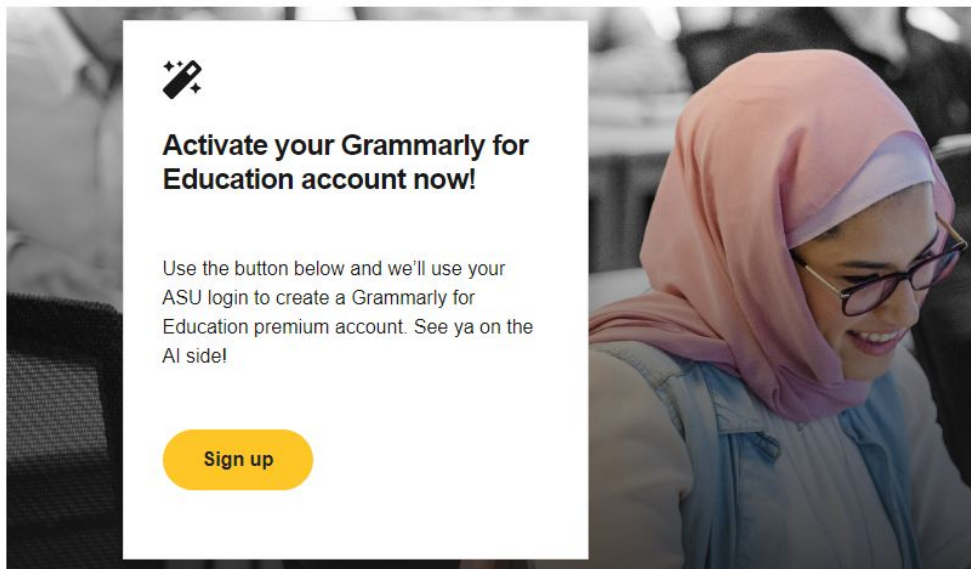
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Don't forget to check out the Online Study Hub for additional resources!

Expanded Writing Support Available

Including Grammarly for Education, at no cost!



tutoring.asu.edu/expanded-writing-support

*Available slots for this pilot are limited

Additional Resources

- [Course Repo](#)
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