SER 321 B Session

SI Session

Thursday, April 24th 2025

7:00 pm - 8:00 pm MST

Agenda

- Lightning Consensus Review
- Peer to Peer Differences
- Middleware
- Assignment 6 Structure

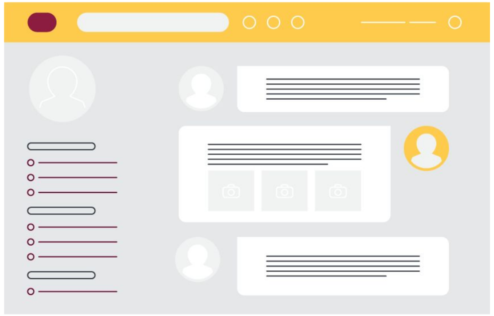
SI Session Expectations

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
Connections

Distributed Connections!

Check out the recording to see our gameplay, or click the link to play yourself!

SER 321
Consensus

Match the Consensus Algorithm to its Description!

2-Phase Commit	If you solve this resource-intensive problem, you may make a request
Blockchain	Leader Election and Log Replication coordinate transactions
Proof of Work	Transaction Coordinator approves and orchestrates transactions
RAFT	Distributed Ledger used to determine if a transaction is valid

Check out the recording for the solution!

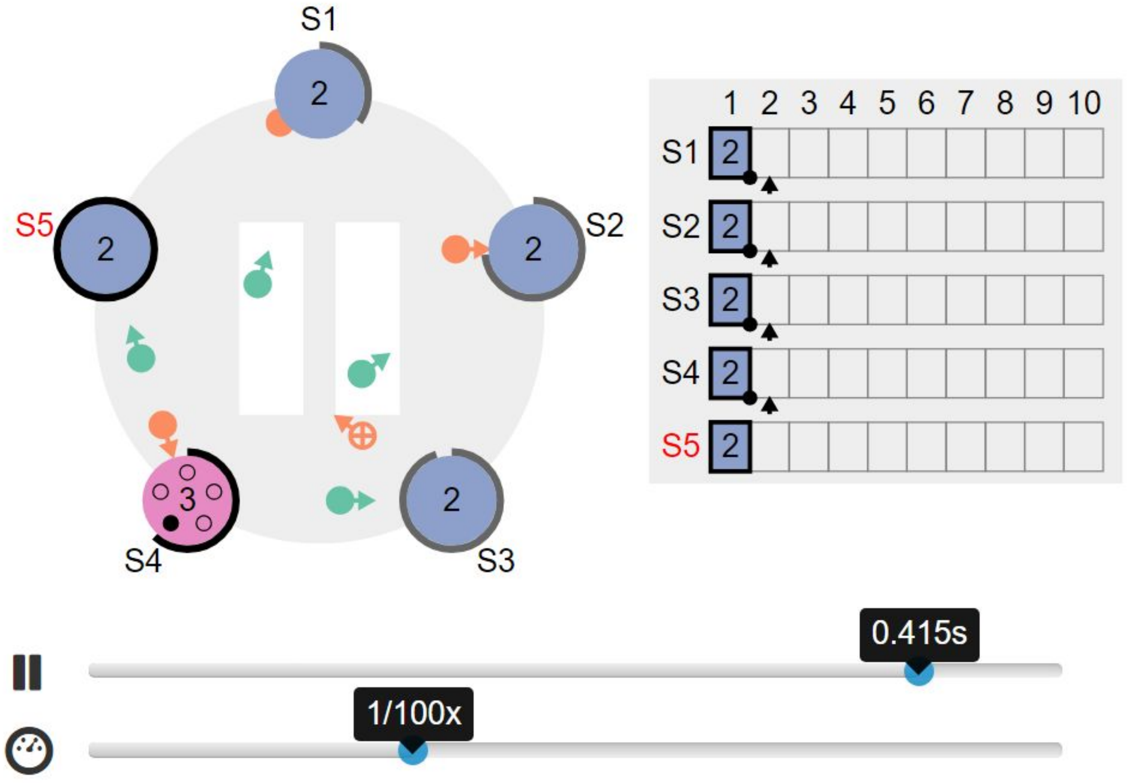
SER 321

RAFT

RAFT is a great consensus example!

Leader Election

Log Replication



	1	2	3	4	5	6	7	8	9	10
S1	2									
S2	2									
S3	2									
S4	2									
S5	2									

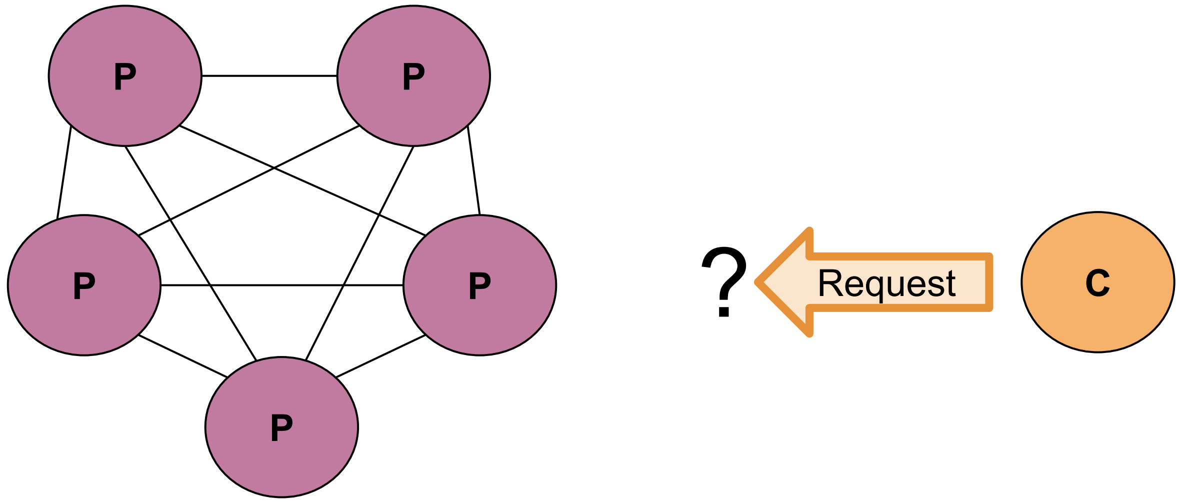
The Secret Lives of Data is a different visualization of Raft. It's more guided and less interactive, so it may be a gentler starting point.

SER 321

Communication

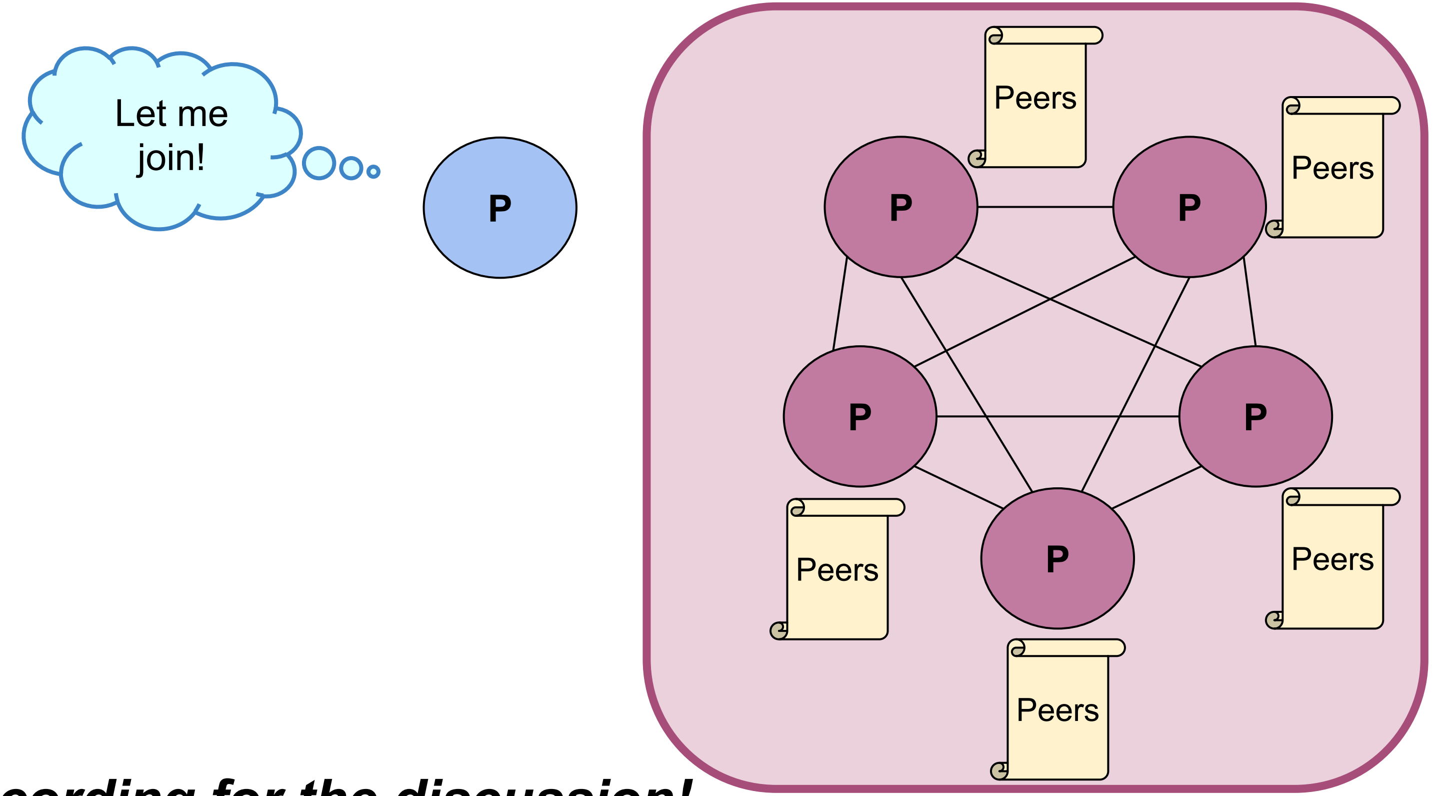
How do we handle the **client** in a Peer to Peer system?

Check out the recording for the discussion!



SER 321
Communication

What about *adding* a Peer to the Cluster?

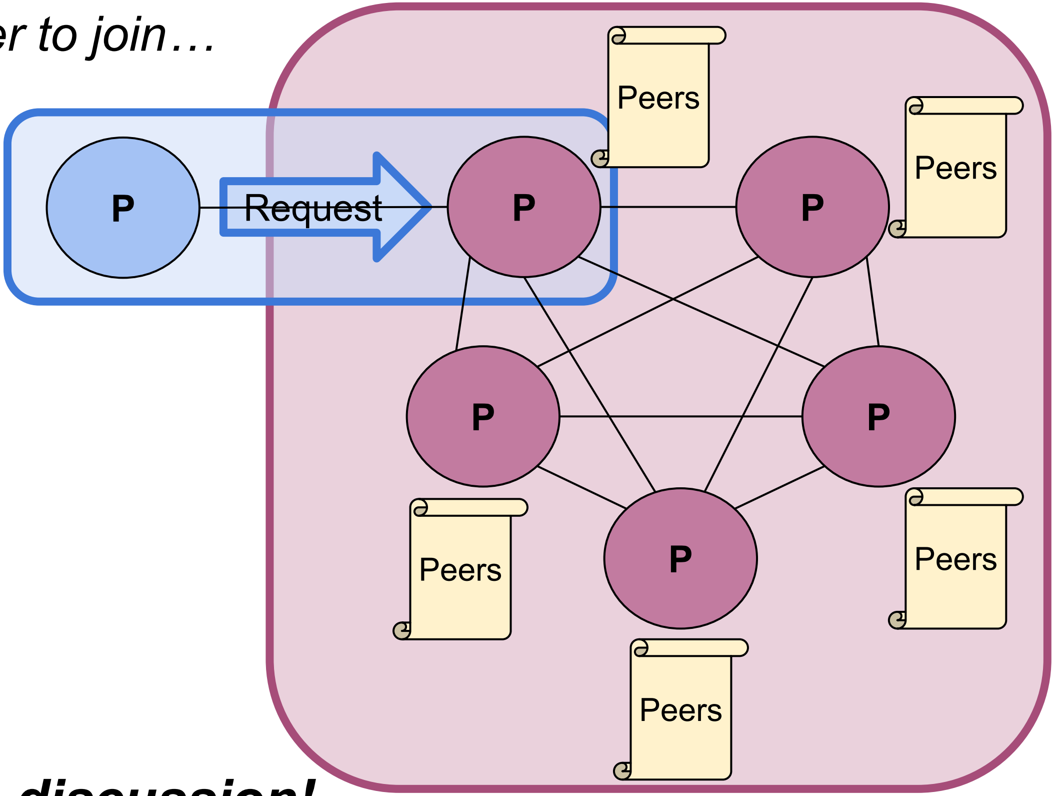


Check out the recording for the discussion!

SER 321
Communication

What about ***adding*** a Peer to the Cluster?

Assuming we want to allow the peer to join…



Is that all?

Check out the recording for the discussion!

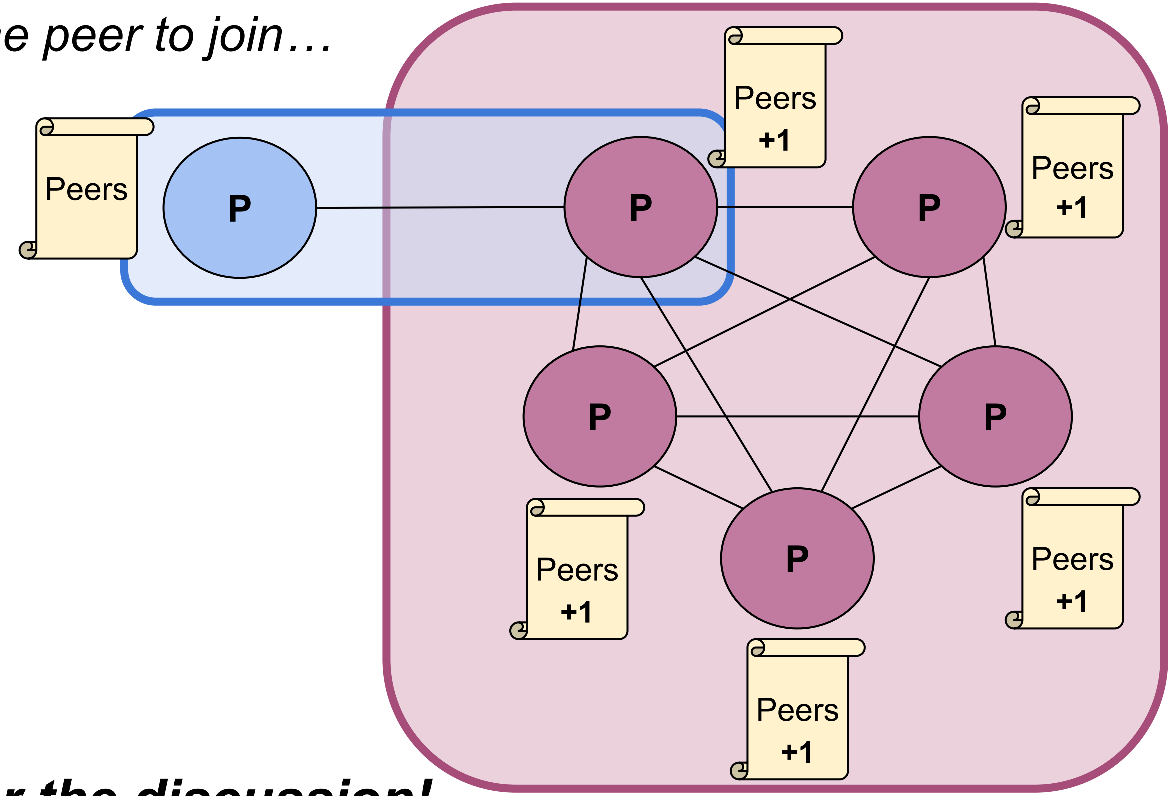
SER 321
Communication

What about ***adding*** a Peer to the Cluster?

Assuming we want to allow the peer to join…

Three Additional Steps:

1.
2.
3.



Check out the recording for the discussion!

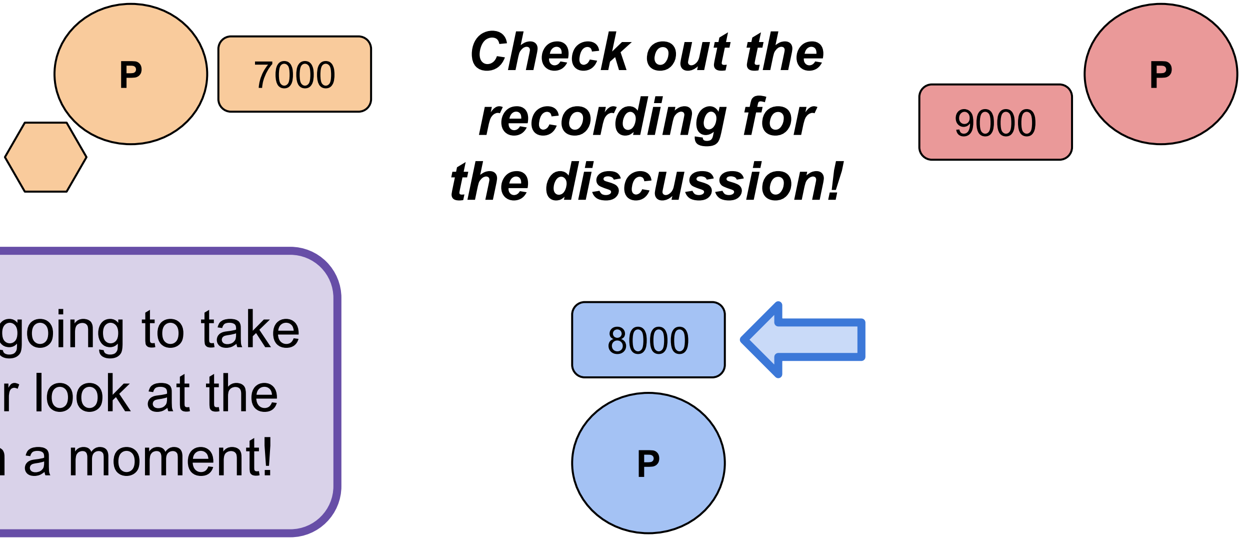
SimplePeerToPeer

SER 321
Communication

Remember that the OS allocates a new port for the client socket!

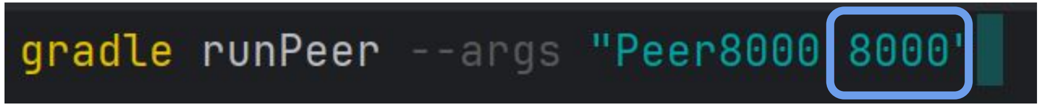
Run With:

```
gradle runPeer --args "Name Port"
```



Check out the recording for the discussion!

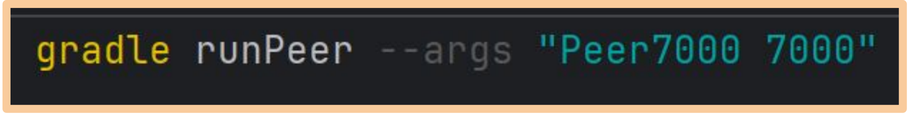
We are going to take a closer look at the code in a moment!



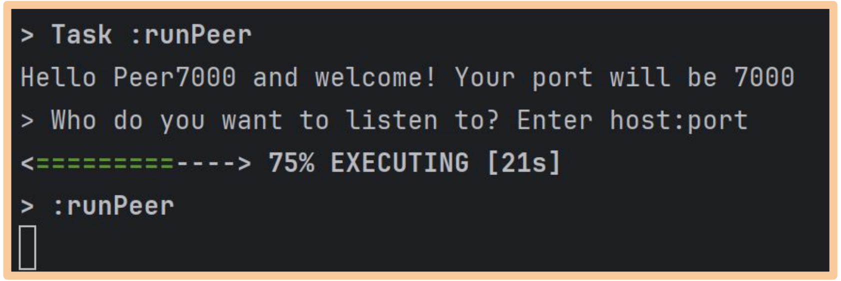
```
gradle runPeer --args "Peer8000 8000"
```

SimplePeerToPeer

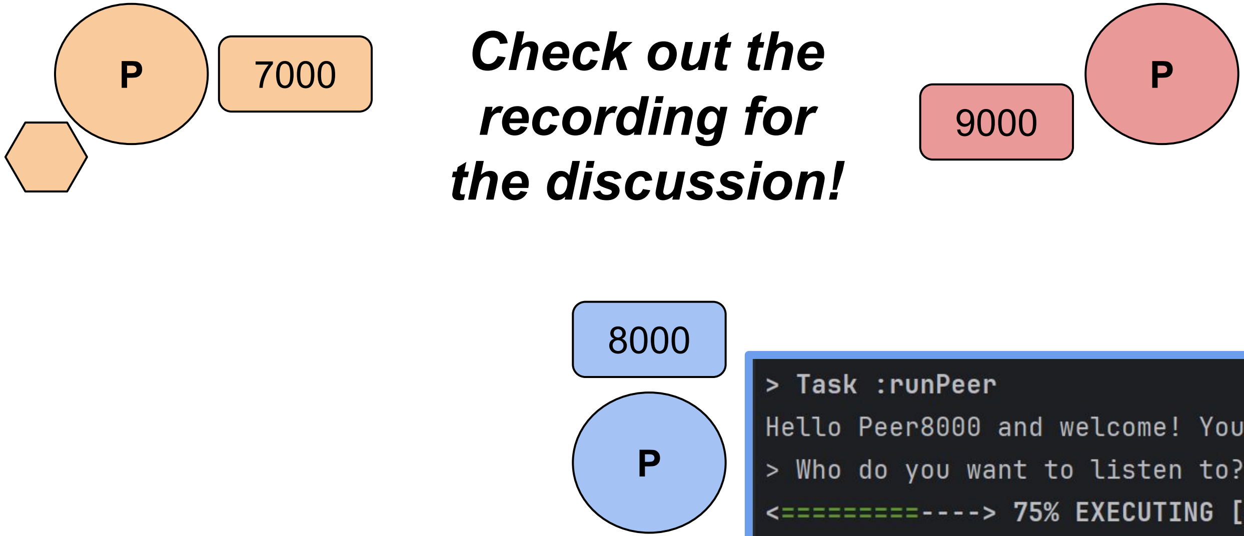
SER 321
Communication



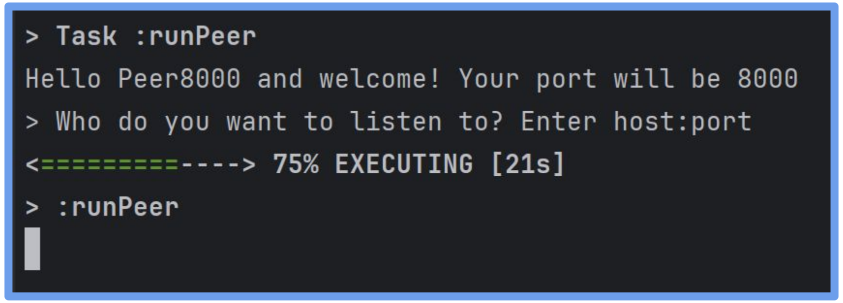
```
gradle runPeer --args "Peer7000 7000"
```



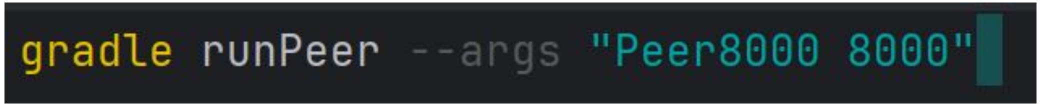
```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=========----> 75% EXECUTING [21s]
> :runPeer
```



Check out the recording for the discussion!



```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<=========----> 75% EXECUTING [21s]
> :runPeer
```

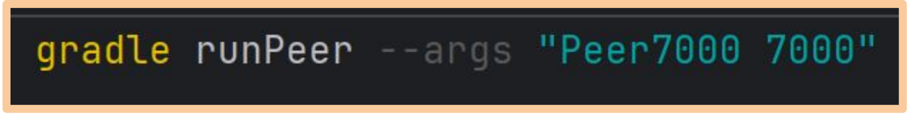


```
gradle runPeer --args "Peer8000 8000"
```

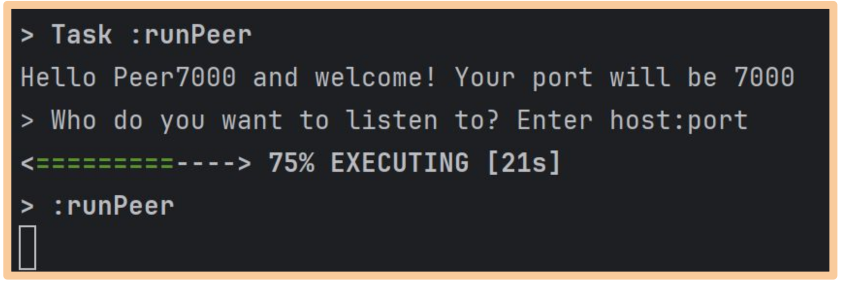
SimplePeerToPeer

SER 321

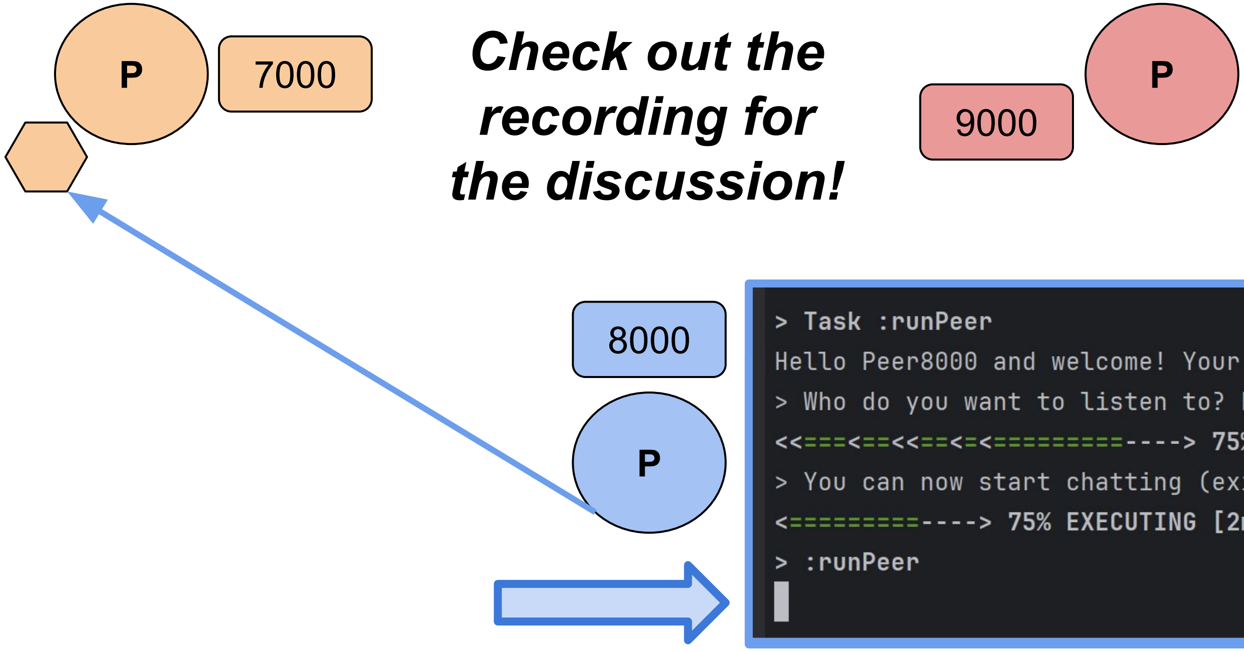
Communication



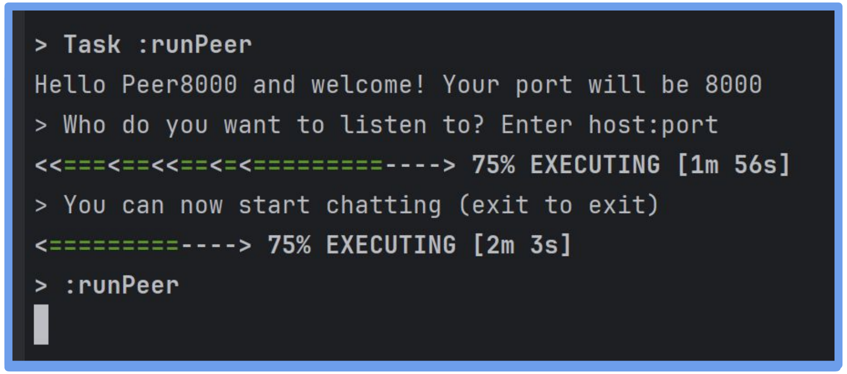
```
gradle runPeer --args "Peer7000 7000"
```



```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<==========----> 75% EXECUTING [21s]
> :runPeer
```



Check out the recording for the discussion!

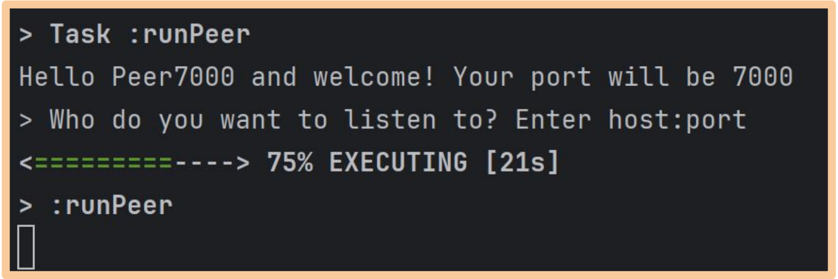


```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<==========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<=========----> 75% EXECUTING [2m 3s]
> :runPeer
```

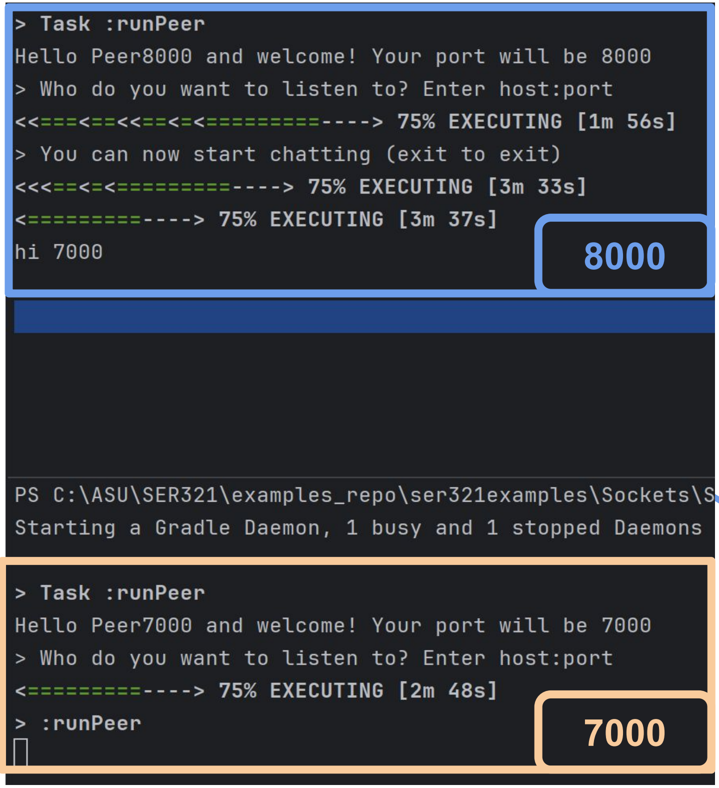
SimplePeerToPeer

SER 321
Communication

What will happen?



```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=========----> 75% EXECUTING [21s]
> :runPeer
```



```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<=========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<<<==<=<=========----> 75% EXECUTING [3m 33s]
<=========----> 75% EXECUTING [3m 37s]
hi 7000
```

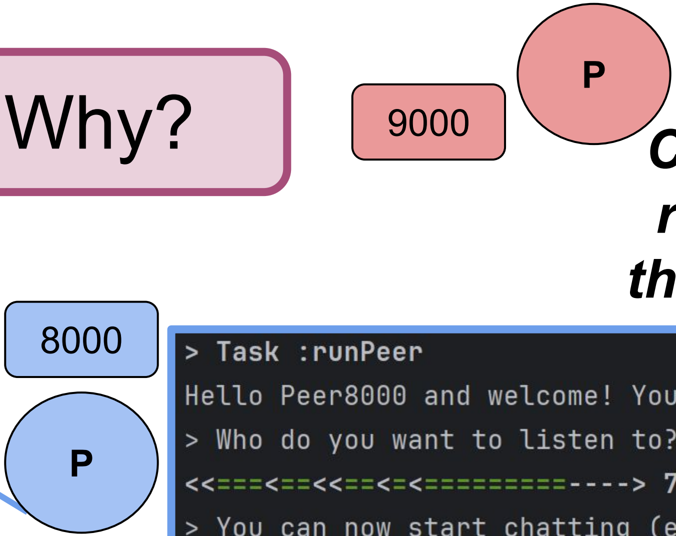
8000

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets\S
Starting a Gradle Daemon, 1 busy and 1 stopped Daemons
```

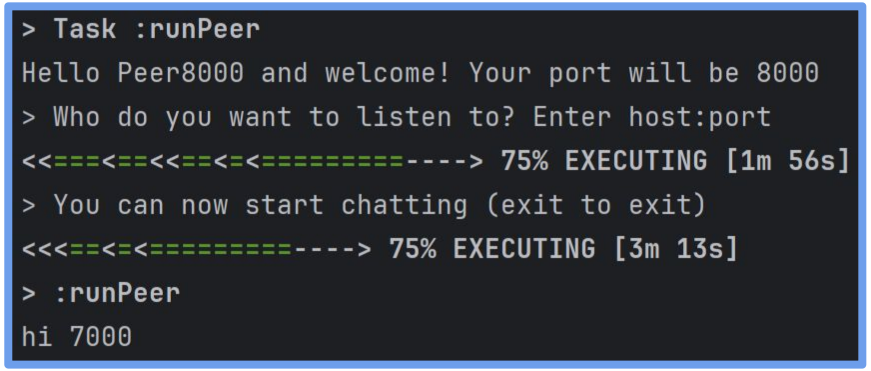
```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=========----> 75% EXECUTING [2m 48s]
> :runPeer
```

7000

Why?

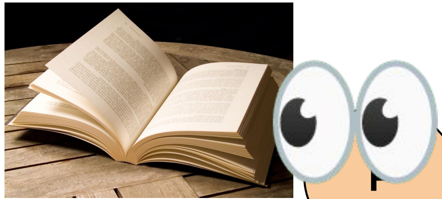


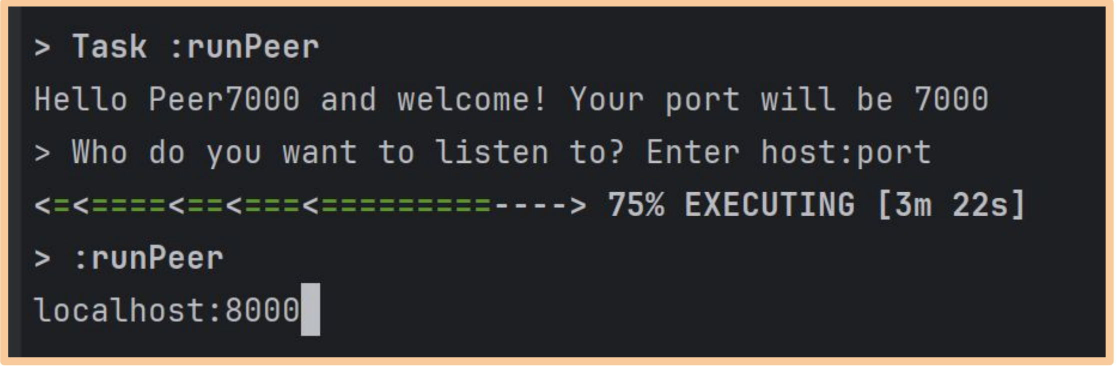
Check out the recording for the discussion!



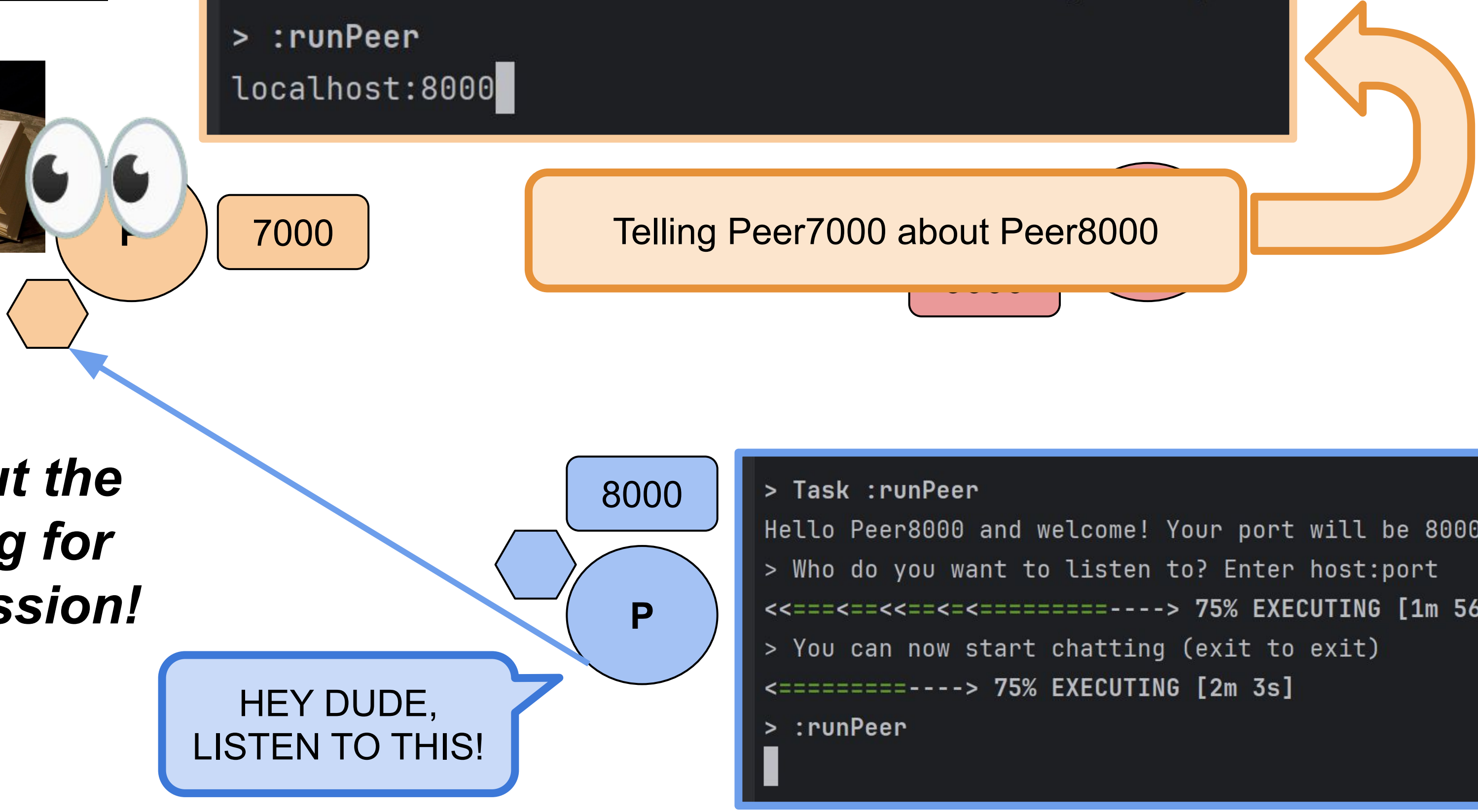
```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<=========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<<<==<=<=========----> 75% EXECUTING [3m 13s]
> :runPeer
hi 7000
```

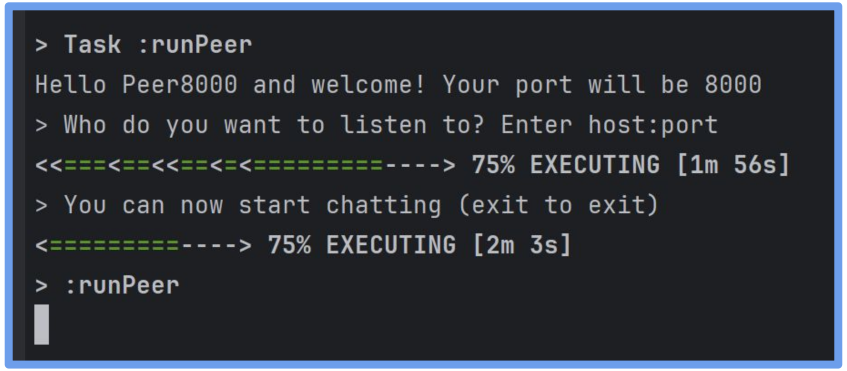
SER 321
Communication





```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=<====<==<===<==========----> 75% EXECUTING [3m 22s]
> :runPeer
localhost:8000
```

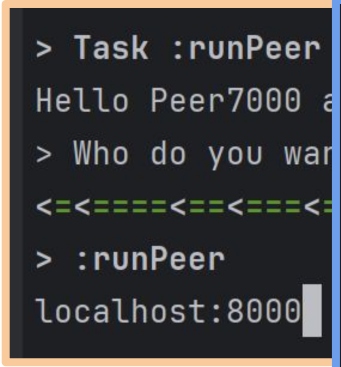




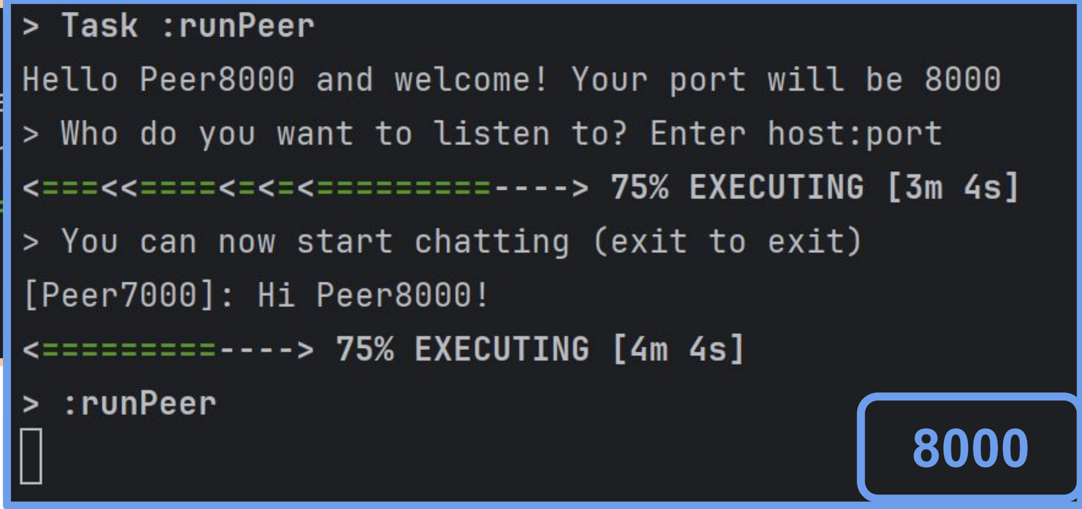
```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<<===<==<<==<=<==========----> 75% EXECUTING [1m 56s]
> You can now start chatting (exit to exit)
<==========----> 75% EXECUTING [2m 3s]
> :runPeer
```

Check out the recording for the discussion!

SER 321
Communication

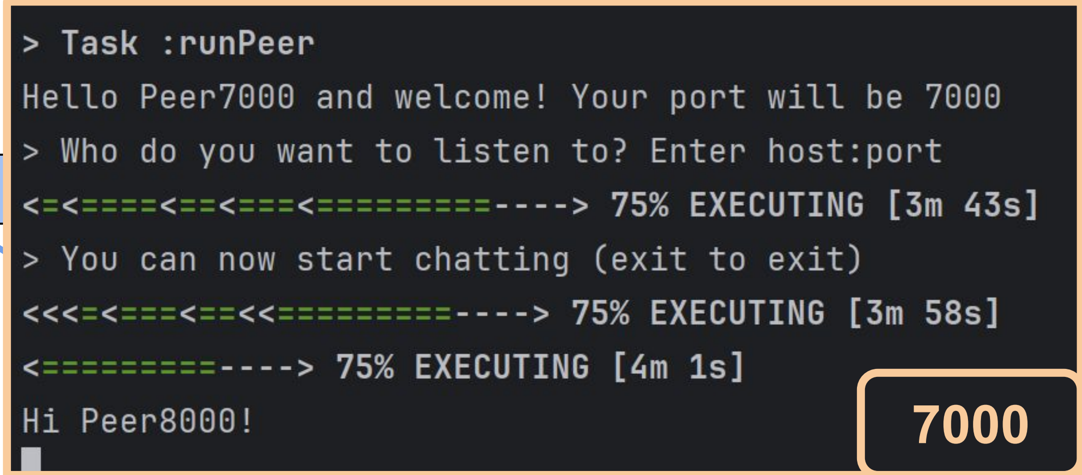


```
> Task :runPeer
Hello Peer7000 a
> Who do you war
<=<====<==<===<
> :runPeer
localhost:8000
```

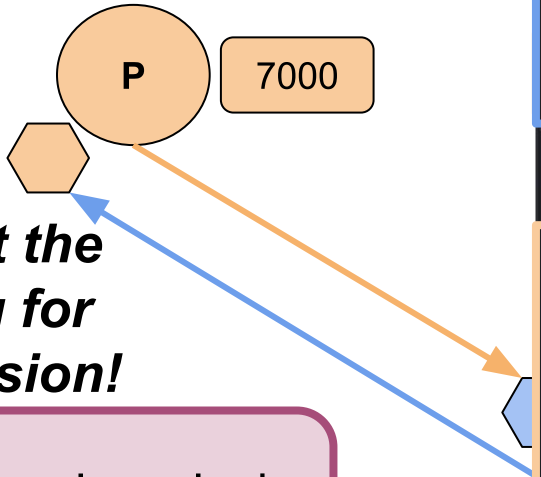


```
> Task :runPeer
Hello Peer8000 and welcome! Your port will be 8000
> Who do you want to listen to? Enter host:port
<===<<====<=<=<=========----> 75% EXECUTING [3m 4s]
> You can now start chatting (exit to exit)
[Peer7000]: Hi Peer8000!
<=========----> 75% EXECUTING [4m 4s]
> :runPeer
```

```
PS C:\ASU\SER321\examples_repo\ser321examples\Sockets\
```



```
> Task :runPeer
Hello Peer7000 and welcome! Your port will be 7000
> Who do you want to listen to? Enter host:port
<=<====<==<===<=========----> 75% EXECUTING [3m 43s]
> You can now start chatting (exit to exit)
<<<=<===<==<<=========----> 75% EXECUTING [3m 58s]
<=========----> 75% EXECUTING [4m 1s]
Hi Peer8000!
```



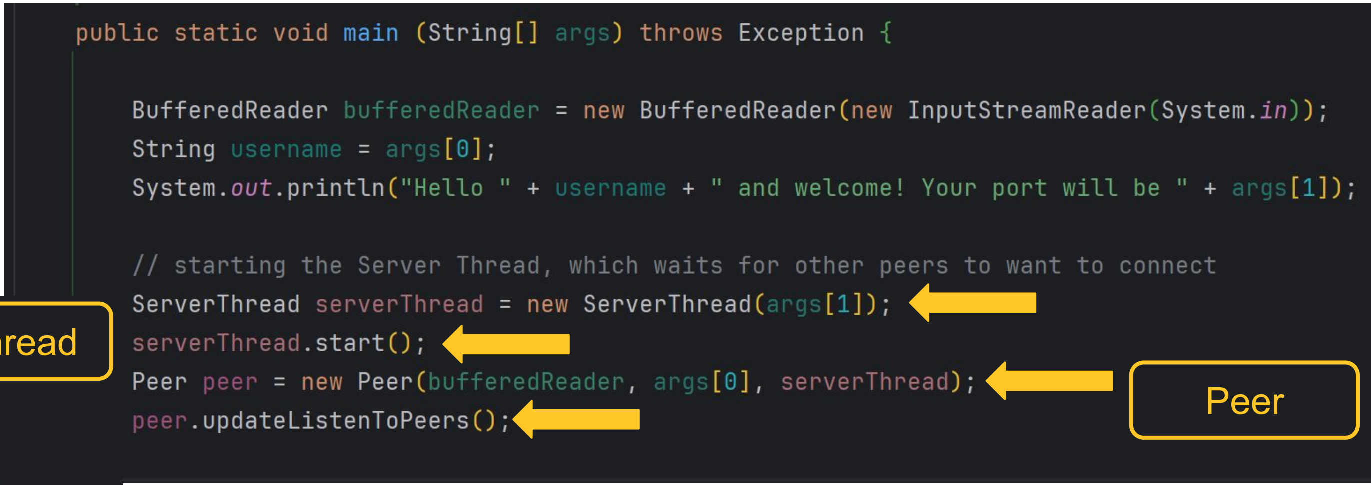
Check out the recording for the discussion!

Let's take a closer look at the Code!

SimplePeerToPeer

SER 321

Communication



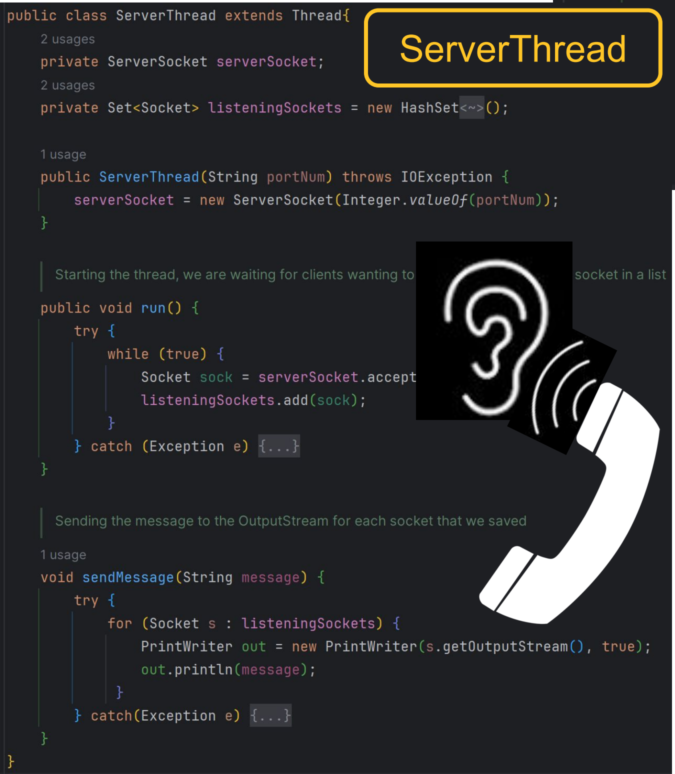
```
public static void main (String[] args) throws Exception {

    BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(System.in));
    String username = args[0];
    System.out.println("Hello " + username + " and welcome! Your port will be " + args[1]);

    // starting the Server Thread, which waits for other peers to want to connect
    ServerThread serverThread = new ServerThread(args[1]);
    serverThread.start();
    Peer peer = new Peer(bufferedReader, args[0], serverThread);
    peer.updateListenToPeers();
```

Peer

ServerThread



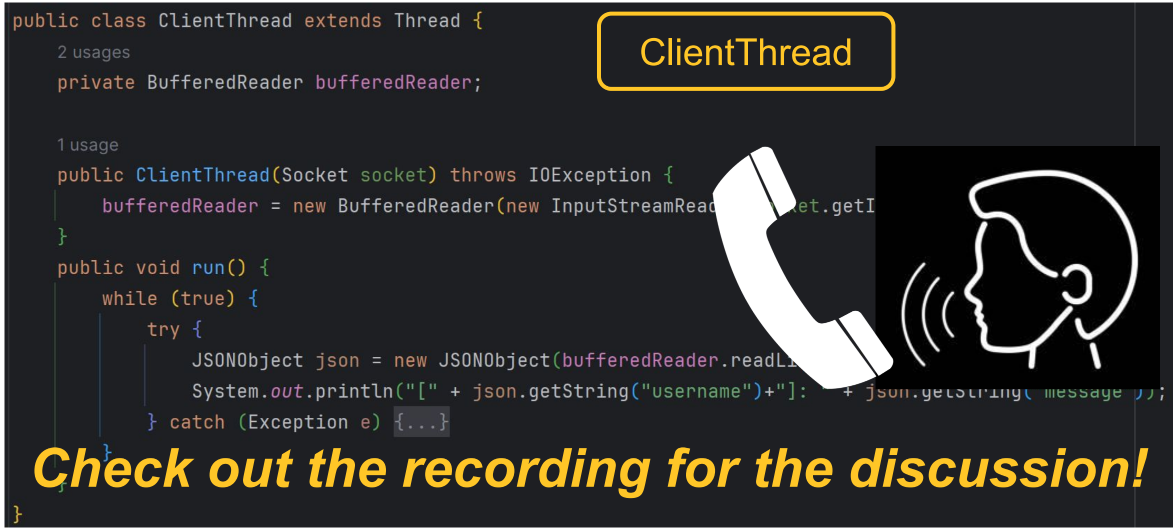
```
public class ServerThread extends Thread{
    2 usages
    private ServerSocket serverSocket;
    2 usages
    private Set<Socket> listeningSockets = new HashSet<~>();

    1 usage
    public ServerThread(String portNum) throws IOException {
        serverSocket = new ServerSocket(Integer.valueOf(portNum));
    }

    Starting the thread, we are waiting for clients wanting to                socket in a list
    public void run() {
        try {
            while (true) {
                Socket sock = serverSocket.accept
                listeningSockets.add(sock);
            }
        } catch (Exception e) {...}
    }

    Sending the message to the OutputStream for each socket that we saved
    1 usage
    void sendMessage(String message) {
        try {
            for (Socket s : listeningSockets) {
                PrintWriter out = new PrintWriter(s.getOutputStream(), true);
                out.println(message);
            }
        } catch(Exception e) {...}
    }
}
```

ClientThread



```
public class ClientThread extends Thread {
    2 usages
    private BufferedReader bufferedReader;

    1 usage
    public ClientThread(Socket socket) throws IOException {
        bufferedReader = new BufferedReader(new InputStreamRea        et.getI
    }
    public void run() {
        while (true) {
            try {
                JSONObject json = new JSONObject(bufferedReader.readLi
                System.out.println("[" + json.getString("username")+"]:    + json.getString( message ));
            } catch (Exception e) {...}
        }
    }
}
```

Check out the recording for the discussion!

Check out the recording for the discussion!

SER 321
Middleware

We have been:

Serializing Messages

Sending Messages

Parsing Messages

Handle Messages

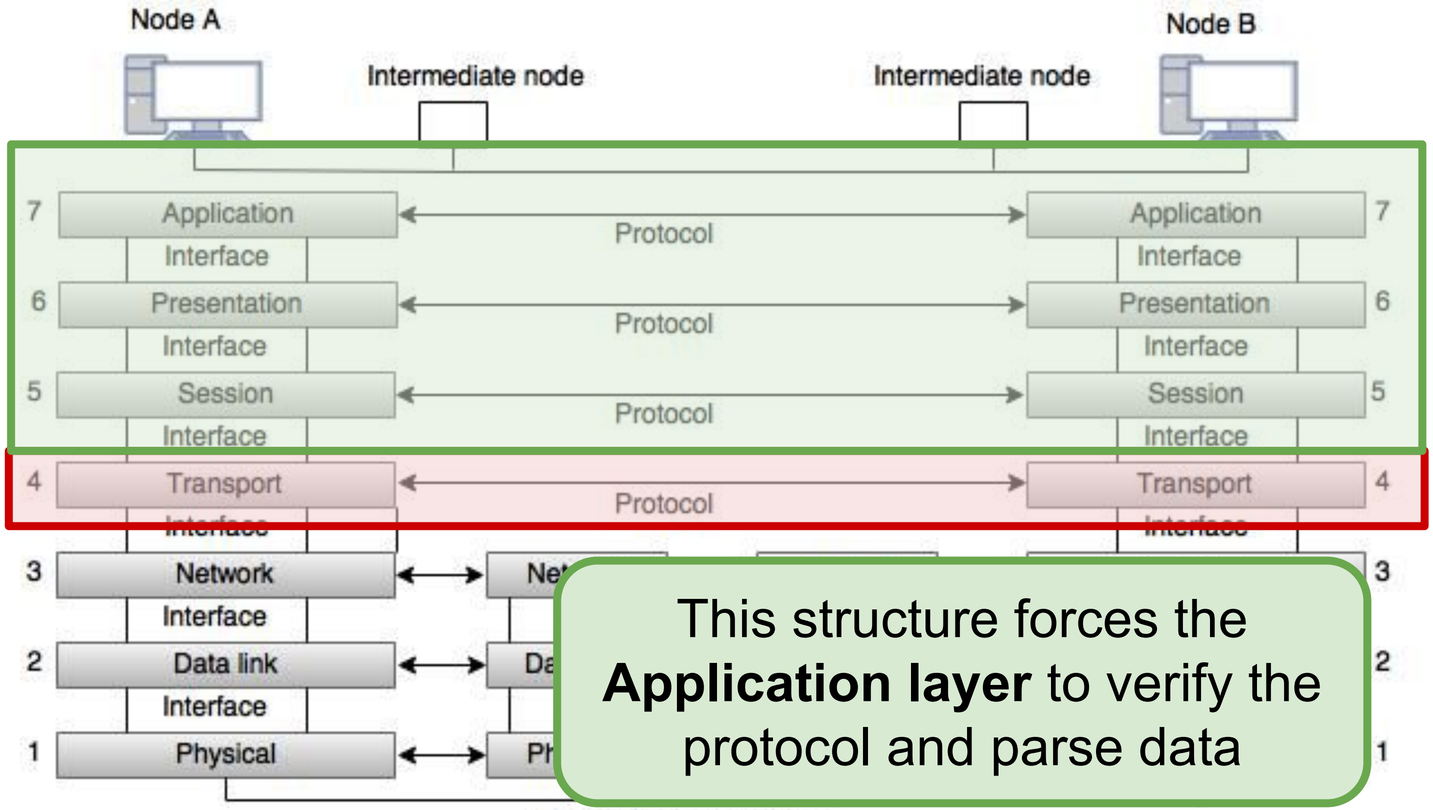


Fig: OSI Model

This structure forces the **Application layer** to verify the protocol and parse data

Not really its job…

SER 321
Middleware

Check out the recording for the discussion!

With Middleware:

Serializing Messages

Sending Messages

Parsing Messages

Handle Messages

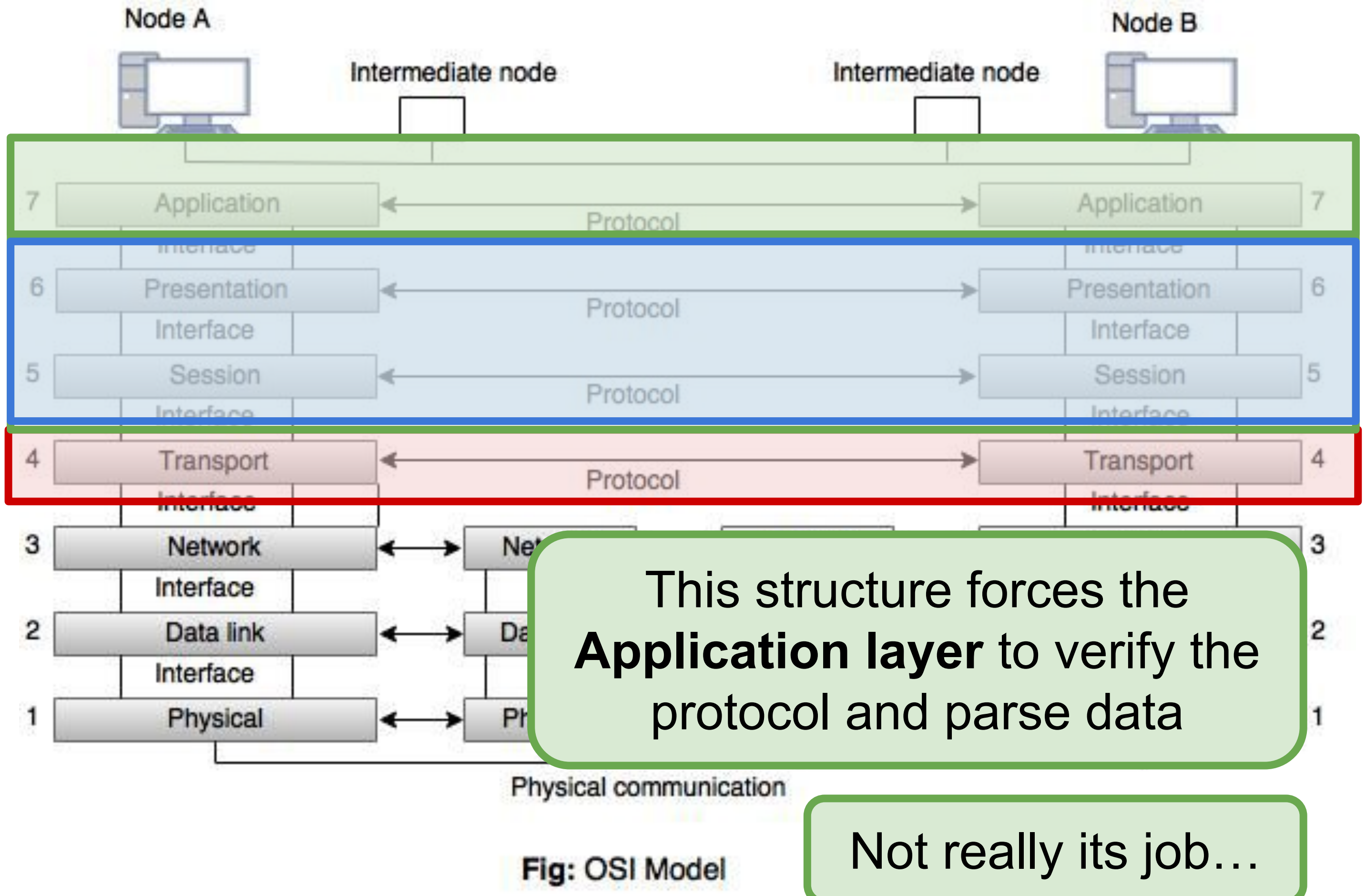


Fig: OSI Model

This structure forces the **Application layer** to verify the protocol and parse data

Not really its job…

SER 321
Middleware

Check out the recording for the discussion!

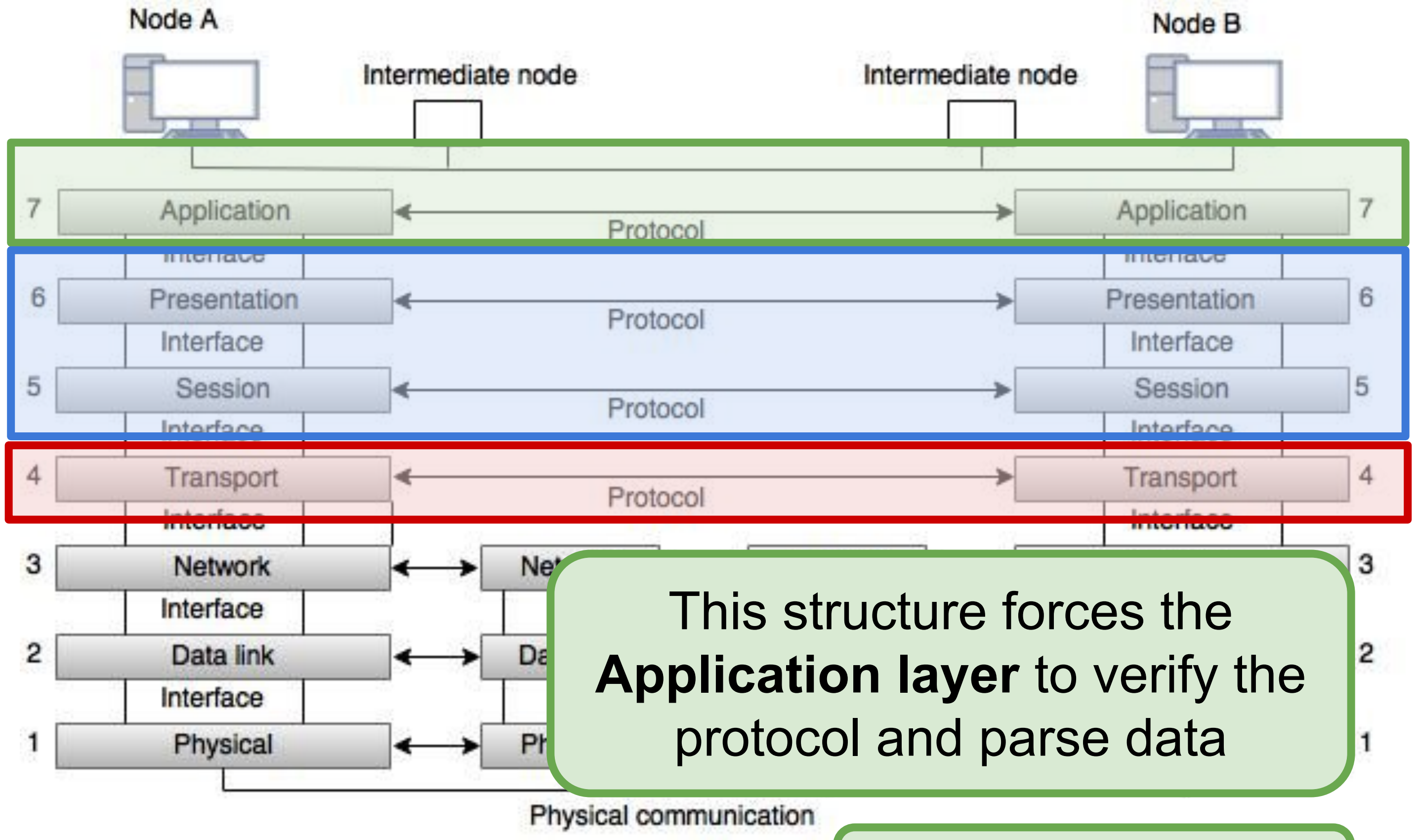
With Middleware:

Serializing Messages

Sending Messages

Parsing Messages

Handle Messages



This structure forces the **Application layer** to verify the protocol and parse data

Fig: OSI Model

Not really its job…

Check out the recording for the discussion!

SER 321
Middleware

Middleware:

Session Layer Responsibilities:

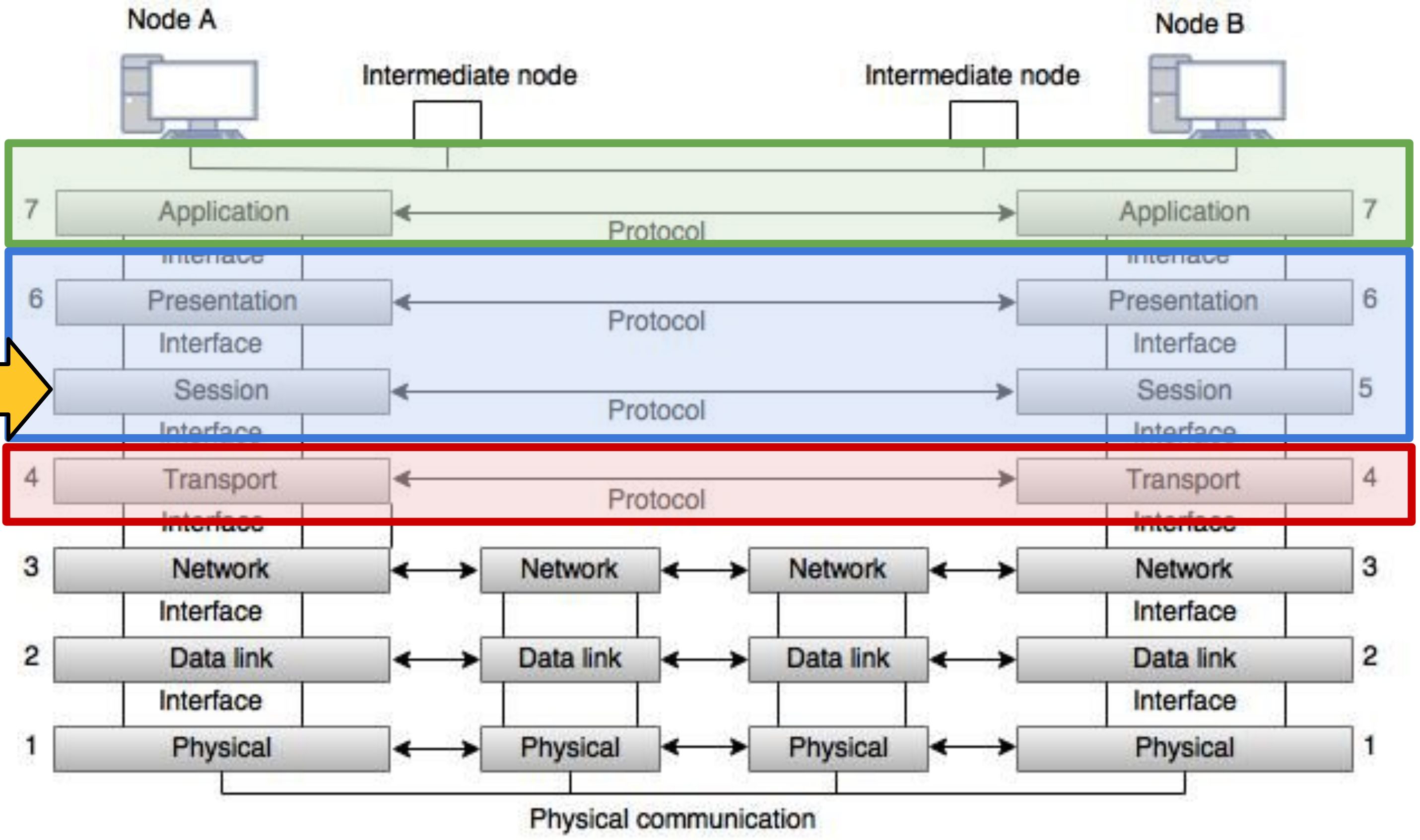


Fig: OSI Model

Check out the recording for the discussion!

SER 321
Middleware

Middleware:

Presentation Layer Responsibilities:

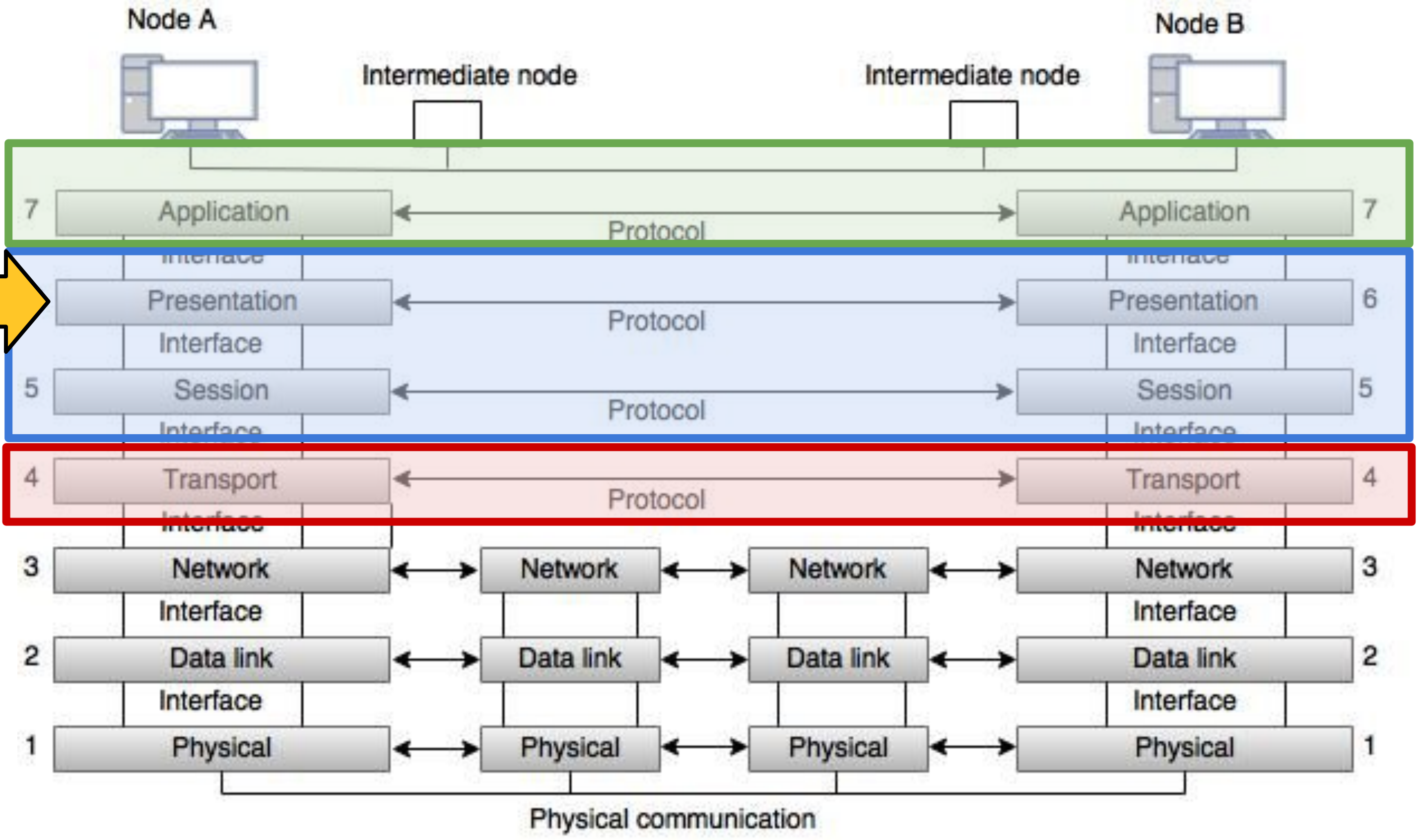


Fig: OSI Model

SER 321
Middleware

Examples?

Check out the recording for the discussion!

Message Oriented Middleware (MOM)

Web Frameworks

Remote Procedure Calls (RPC) ★

App. Programming Interface (API) ★

SER 321

Scratch Space

Upcoming Events

SI Sessions:

- Sunday, April 27th at **6:00 pm** MST - **2 hour Exam Review Session**
- Tuesday, April 29th, at 10:00 am MST - **Q&A Session**

Review Sessions:

- Sunday, April 27th at **6:00 pm** MST - **2 hour Exam Review Session**
- Tuesday, April 29th, at 10:00 am MST - **Q&A Session**

Questions?

Survey:

https://asuasn.info/ASNSurvey

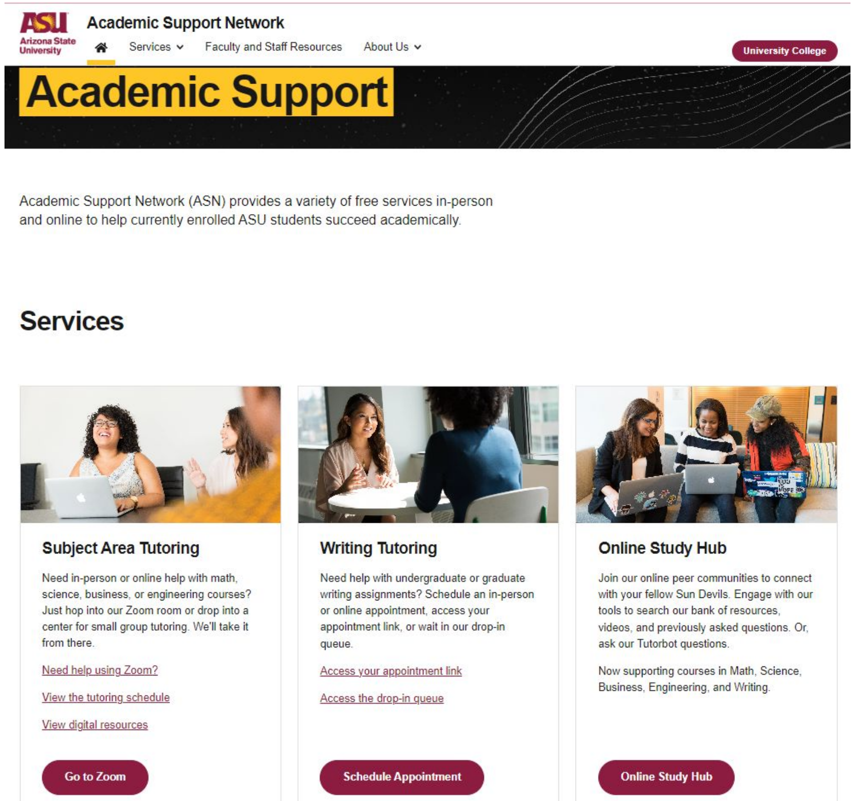
bitly

27

More Questions?

Check out our other resources!

tutoring.asu.edu


Academic Support Network

Services · Faculty and Staff Resources · About Us · University College

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.

Need help using Zoom?

View the tutoring schedule

View digital resources

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.

Access your appointment link

Access the drop-in queue

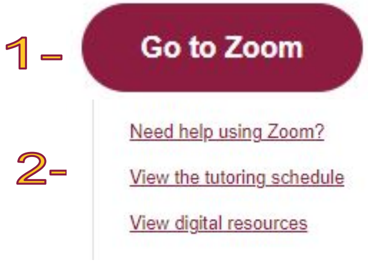
Schedule Appointment

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

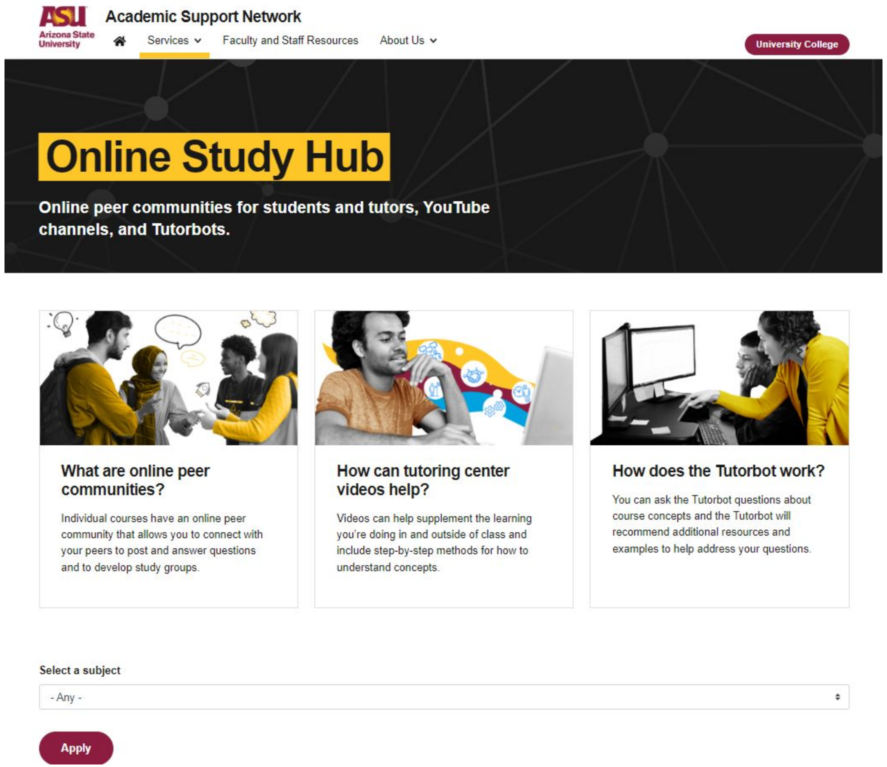


1. **Click on 'Go to Zoom' to log onto our Online Tutoring Center.**
2. **Click on 'View the tutoring schedule' to see when tutors are available for specific courses.**

More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub


Academic Support Network

Online Study Hub

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

What are online peer communities?

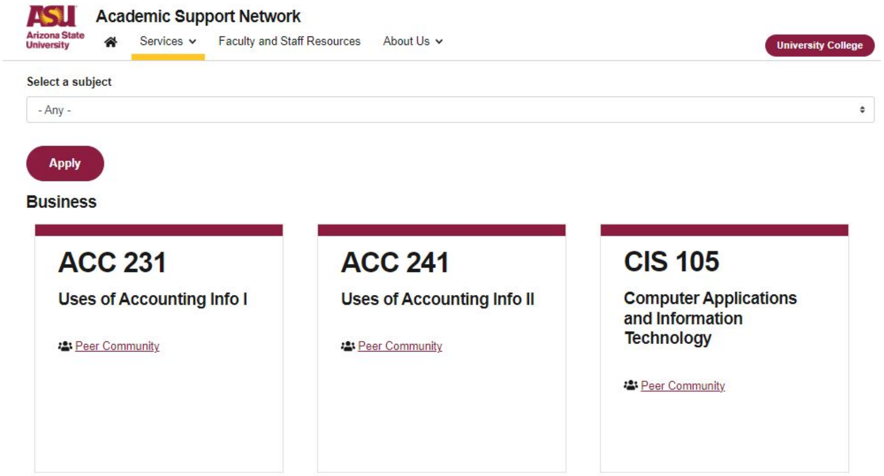
Individual courses have an online peer community that allows you to connect with your peers to post and answer questions and to develop study groups.

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.


Academic Support Network

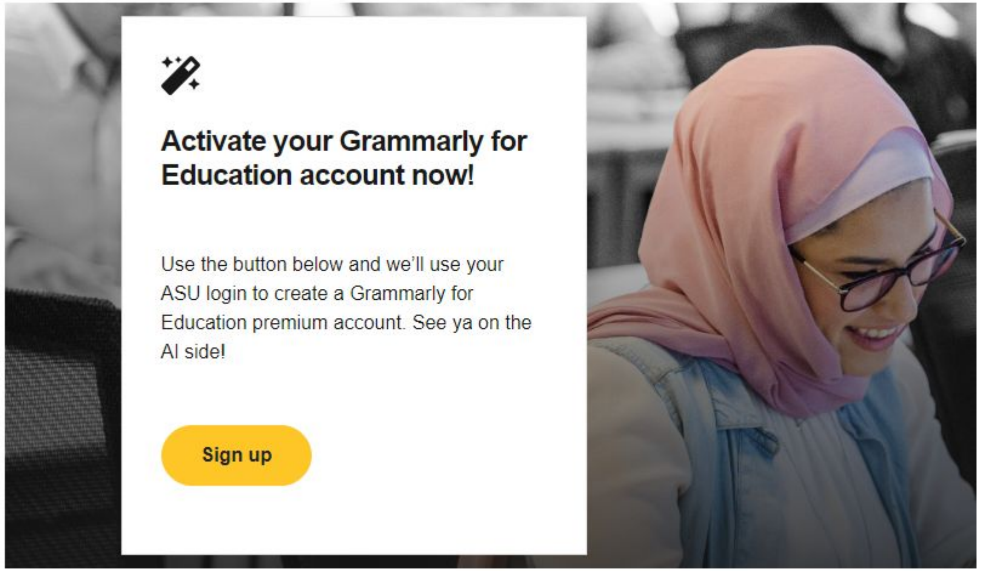
Business

ACC 231 Uses of Accounting Info I	**ACC 241** Uses of Accounting Info II	**CIS 105** Computer Applications and Information Technology
Peer Community	Peer Community	Peer Community

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

Expanded Writing Support Available

Including Grammarly for Education, at no cost!



Activate your Grammarly for Education account now!

Use the button below and we'll use your ASU login to create a Grammarly for Education premium account. See ya on the AI side!

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
- Dining Philosophers Interactive
- Austin G Walters Traffic Comparison
- RAFT