SER 321 B Session

Exam Review Session

Sunday, April 21st 2024

7:00 pm - 9:00 pm MST

Agenda

Exam Info

Study Guide

Review!

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
Exam Information

80 minutes

Similar to the quizzes

Exam Info Page

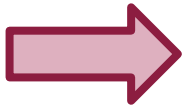
Opens: Wednesday
April 24th
@ 12:01 AM

Closes: Friday
April 26th
@ 11:59 PM

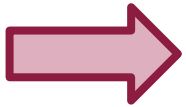
SER 321

OSI Model

Unit	Layer	What we are *really* talking about



SER 321
OSI Model



Unit	Layer	What we are *really* talking about
Bits	Physical	Signal, Binary transmission

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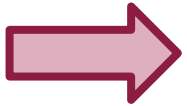
OSI Model



Unit	Layer	What we are *really* talking about
Frame	Data Link	LLC, MAC, data transmission in LAN
Bits	Physical	Signal, Binary transmission

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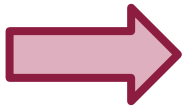
OSI Model



Unit	Layer	What we are *really* talking about
Packet	Network	IP address, routing and delivery
Frame	Data Link	LLC, MAC, data transmission in LAN
Bits	Physical	Signal, Binary transmission

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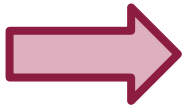
OSI Model



Unit	Layer	What we are *really* talking about
Segment	Transport	TCP/UDP
Packet	Network	IP address, routing and delivery
Frame	Data Link	LLC, MAC, data transmission in LAN
Bits	Physical	Signal, Binary transmission

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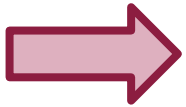
OSI Model



Unit	Layer	What we are *really* talking about
Data	Session	AuthN, authZ, session mgmt
Segment	Transport	TCP/UDP
Packet	Network	IP address, routing and delivery
Frame	Data Link	LLC, MAC, data transmission in LAN
Bits	Physical	Signal, Binary transmission

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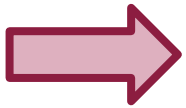
OSI Model



Unit	Layer	What we are *really* talking about
Data	Presentation	Translation, compression, encryption
Data	Session	AuthN, authZ, session mgmt
Segment	Transport	TCP/UDP
Packet	Network	IP address, routing and delivery
Frame	Data Link	LLC, MAC, data transmission in LAN
Bits	Physical	Signal, Binary transmission

SER 321

Network Layer - IP

Given the following IP address, identify the…

Port

128.148.32.110:8080

SER 321

Network Layer - IP

Given the following IP address, identify the…

Subnet

128.148.32.110:8080

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Network Layer - IP

Given the following IP address, identify the…

Network

128.148.32.110:8080

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Network Layer - IP

Given the following IP address, identify the…

Host

128.148.32.110:8080

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TCP/UDP

What are the main differences?

TCP	UDP

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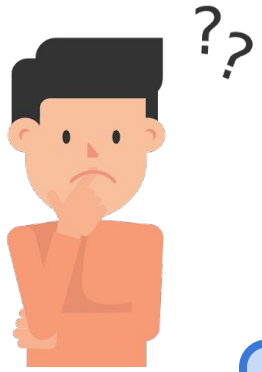
HTTP(S)



Stateful OR Stateless

Synchronous OR Asynchronous

SER 321
URLS

Given the following URL, identify the…

Query

https://www.google.com/search?q=asu

SER 321
URLS

Given the following URL, identify the…

Protocol

https://www.google.com/search?q=asu

SER 321
URLS

Given the following URL, identify the…

Path

https://www.google.com/search?q=asu

SER 321
URLS

Given the following URL, identify the…

Host

https://www.google.com/search?q=asu

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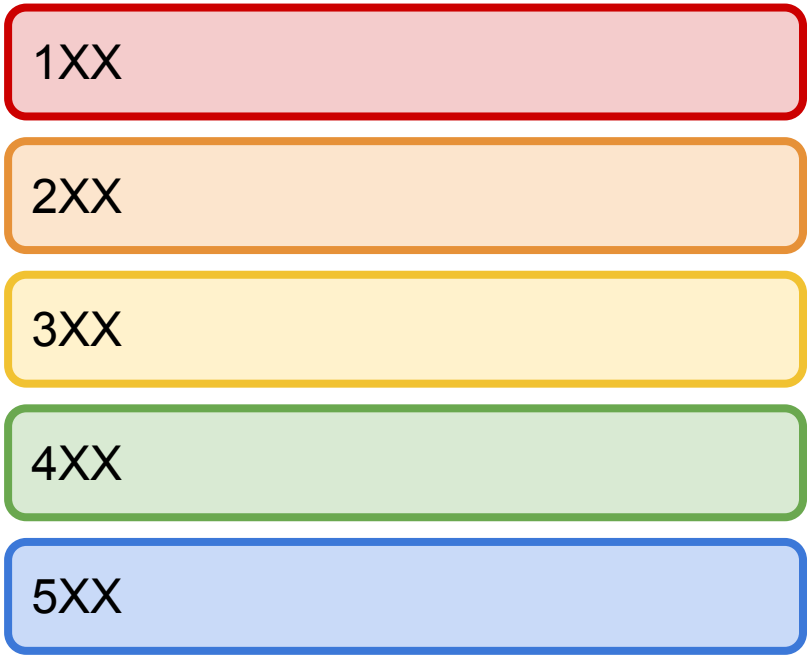
HTTP Responses

Status Codes →

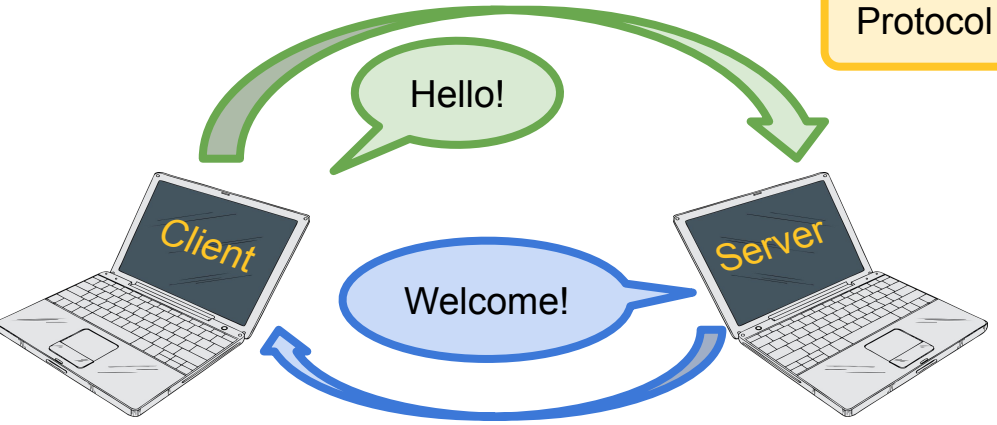


SER 321
Sockets!

Sockets allow our client and server to communicate!

Need to define **3 properties** before usage

Location	IP or DNS	142.251.46.206	www.google.com
Connection Semantics	TCP or UDP	Connection Oriented	Connectionless
Message Format	Protocol Specs	Synchronous	Asynchronous
		Stateless	Stateful
		Binary	Text
		Headers	No Headers



SER 321
Client Socket

Steps for the **Client Socket**

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

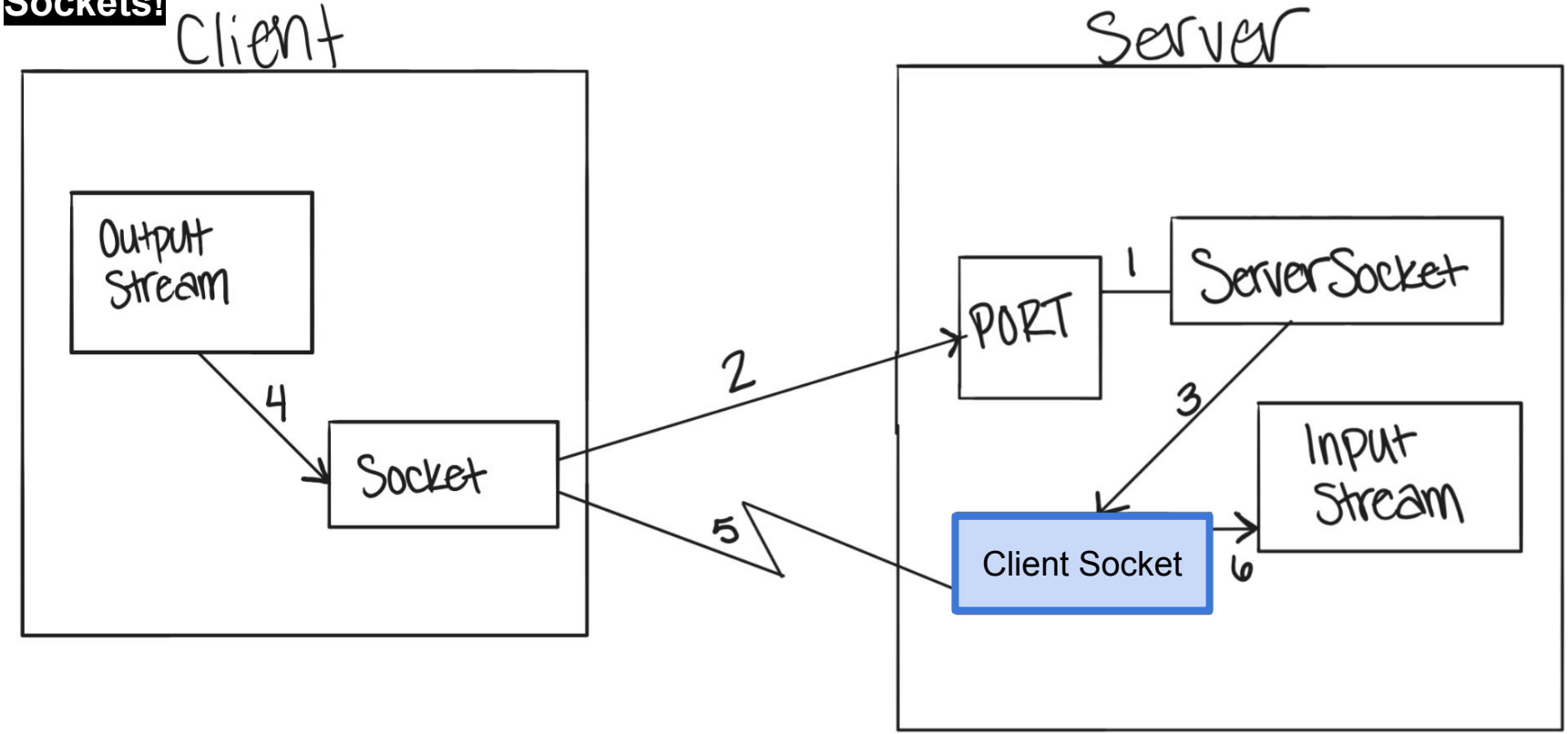
SER 321
Server Socket

Steps for the **Server Socket**

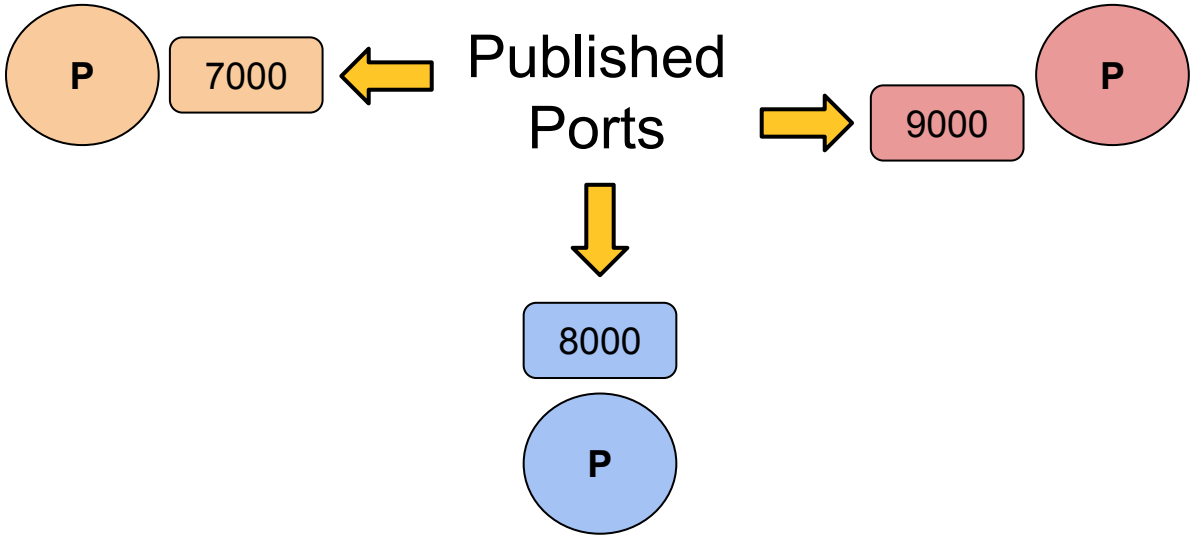
1.
2.
3.
4.
5.
6.
7.
8.
9.

SER 321

Sockets!

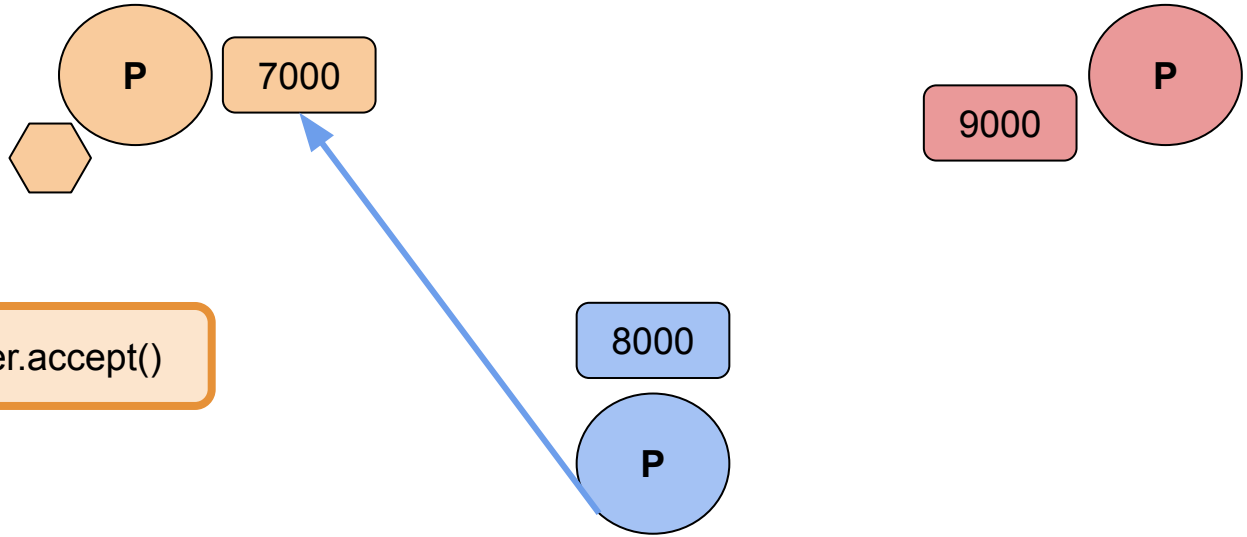


Remember that the OS allocates a new port for the client socket!



SER 321
Communication

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



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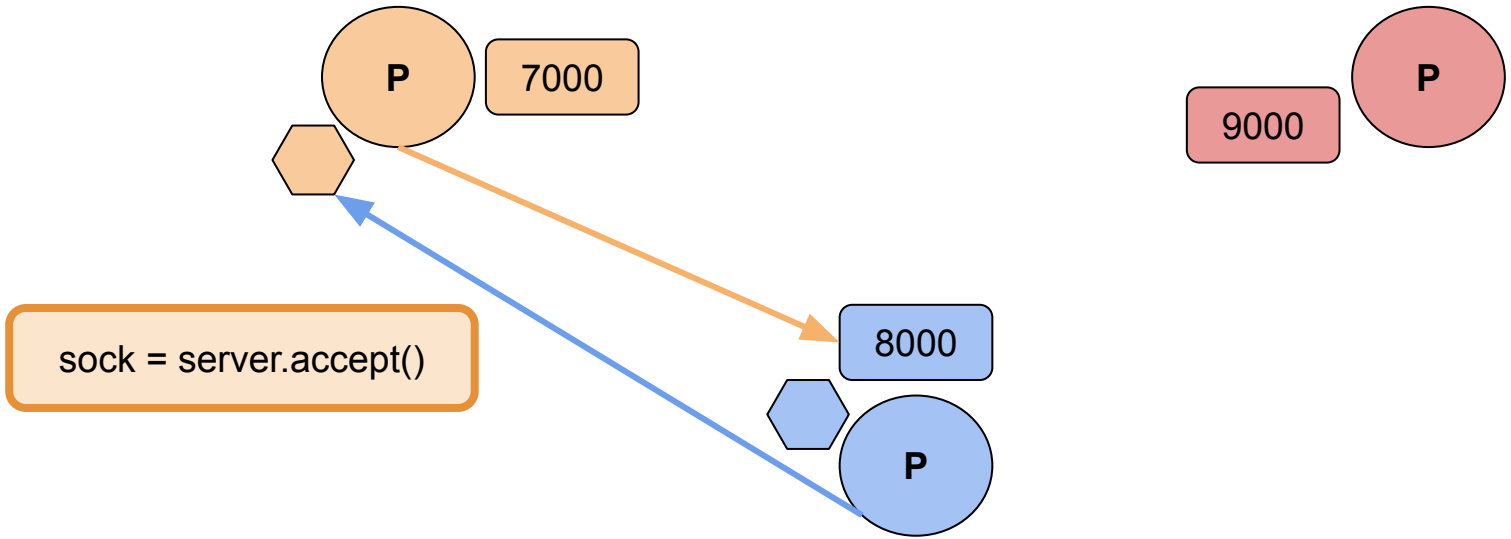

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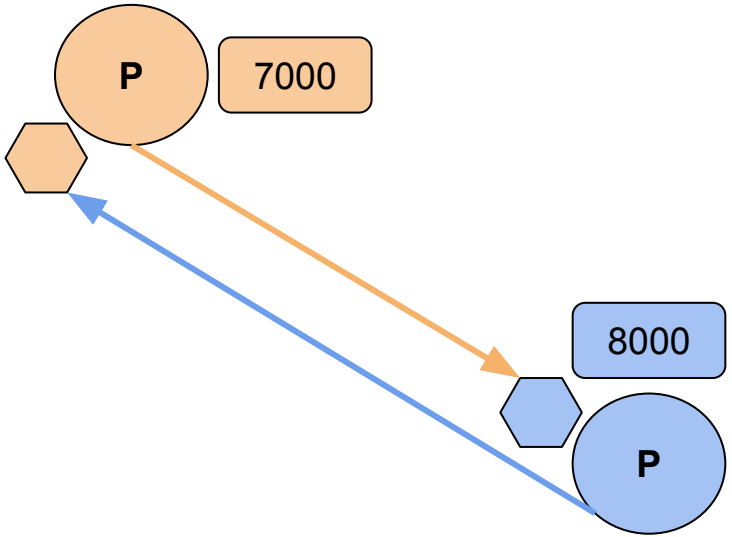
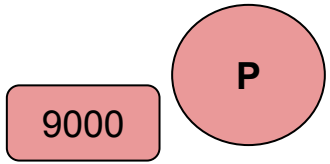
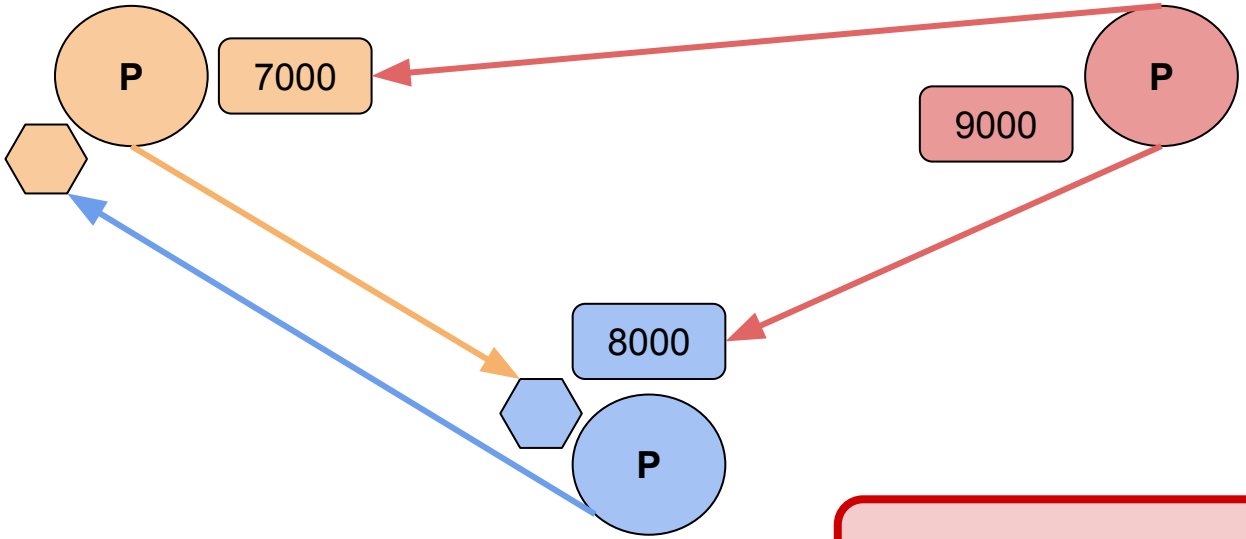




What about Peer 9000?

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



What about Peer 9000?

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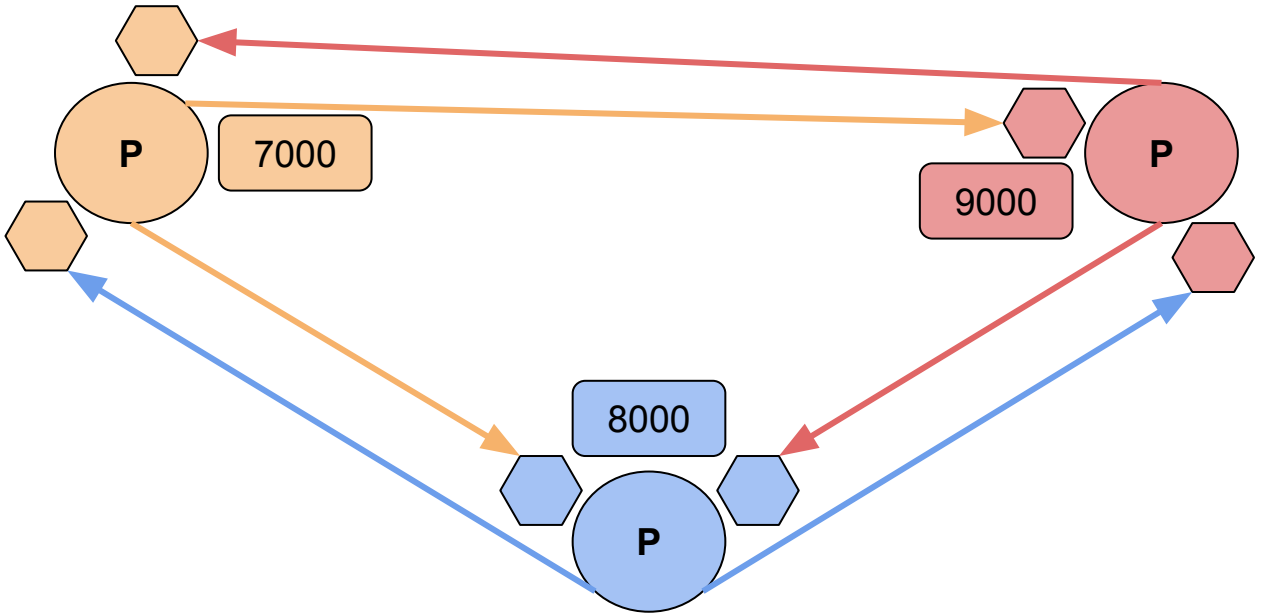

SER 321
Threading Pitfalls

Starvation	A thread is only able to acquire some of the resources it needs
Deadlock	More than one thread accesses a single resource at the same time
Race Condition	A thread never gains access to the resource it needs

SER 321
Threading Pitfalls

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Deadlock	More than one thread accesses a single resource at the same time
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SER 321
Threading Pitfalls

What's the difference?

Starvation	vs.	Deadlock
A thread never gains access to the resource it needs		A thread is only able to acquire some of the resources it needs
Waiting to access the ***CPU***		Waiting to access the ***resource***

SER 321
Serialization

Can we recall some of the formats?

JSON

Java Object Serialization

Protocol Buffers

XML

SER 321
Serialization

Binary

Text

Two main approaches for storing the content…

What about the data format?

JSON

Java Object Serialization

Protocol Buffers

XML

SER 321
Serialization

Binary

Text

Who uses *TEXT*?

Text

JSON

Java Object Serialization

Protocol Buffers

Text

XML

SER 321
Serialization

Binary

Text

What does this imply?

Who uses ***BINARY***?

Text JSON

Binary Java Object Serialization

Binary Protocol Buffers

Text XML

SER 321
Serialization

Streams and their types

Generic Superclass

```
OutputStream out = sock.getOutputStream();
```

Buffered Stream

Bytes

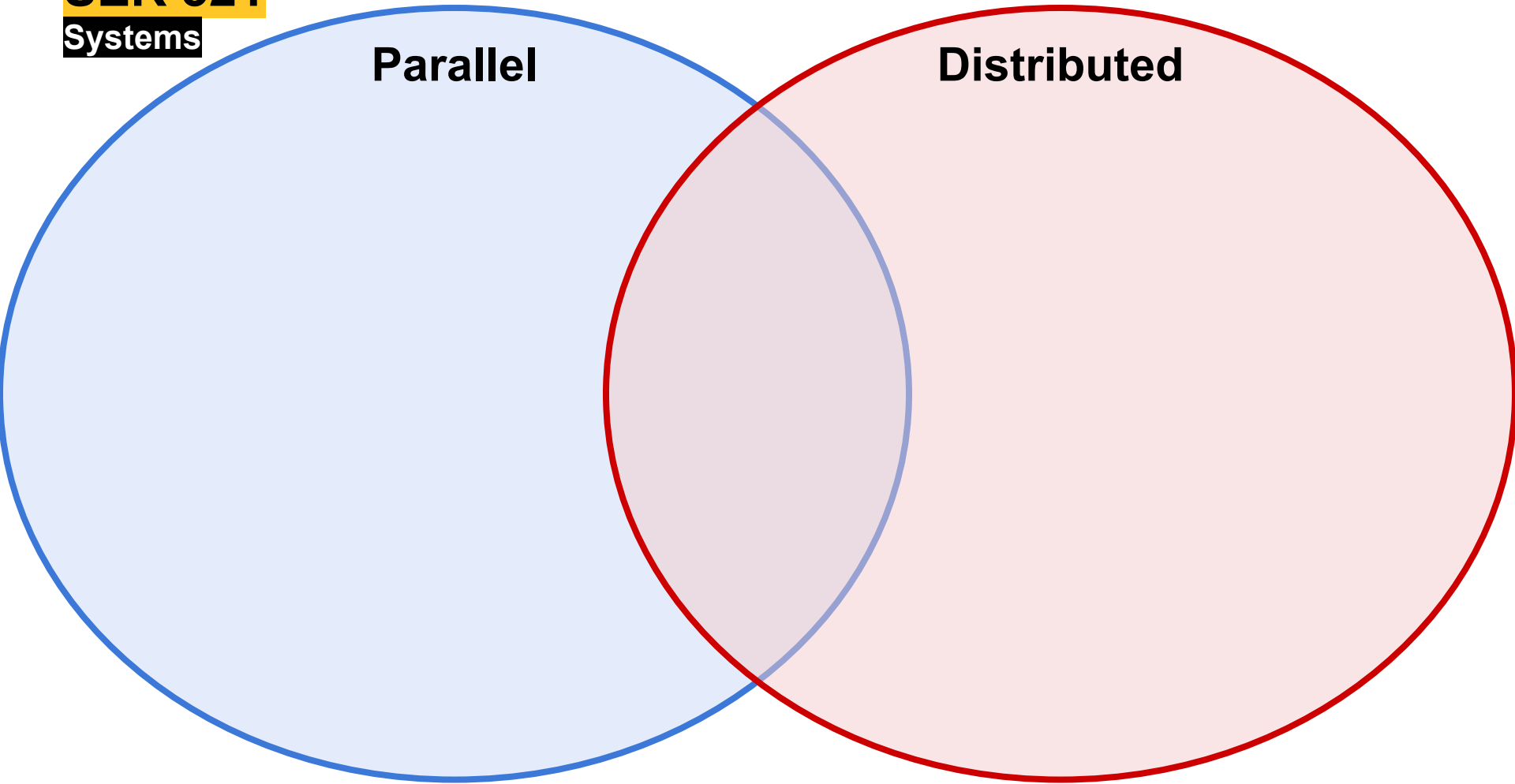
Data Stream

Primitive DATA Types

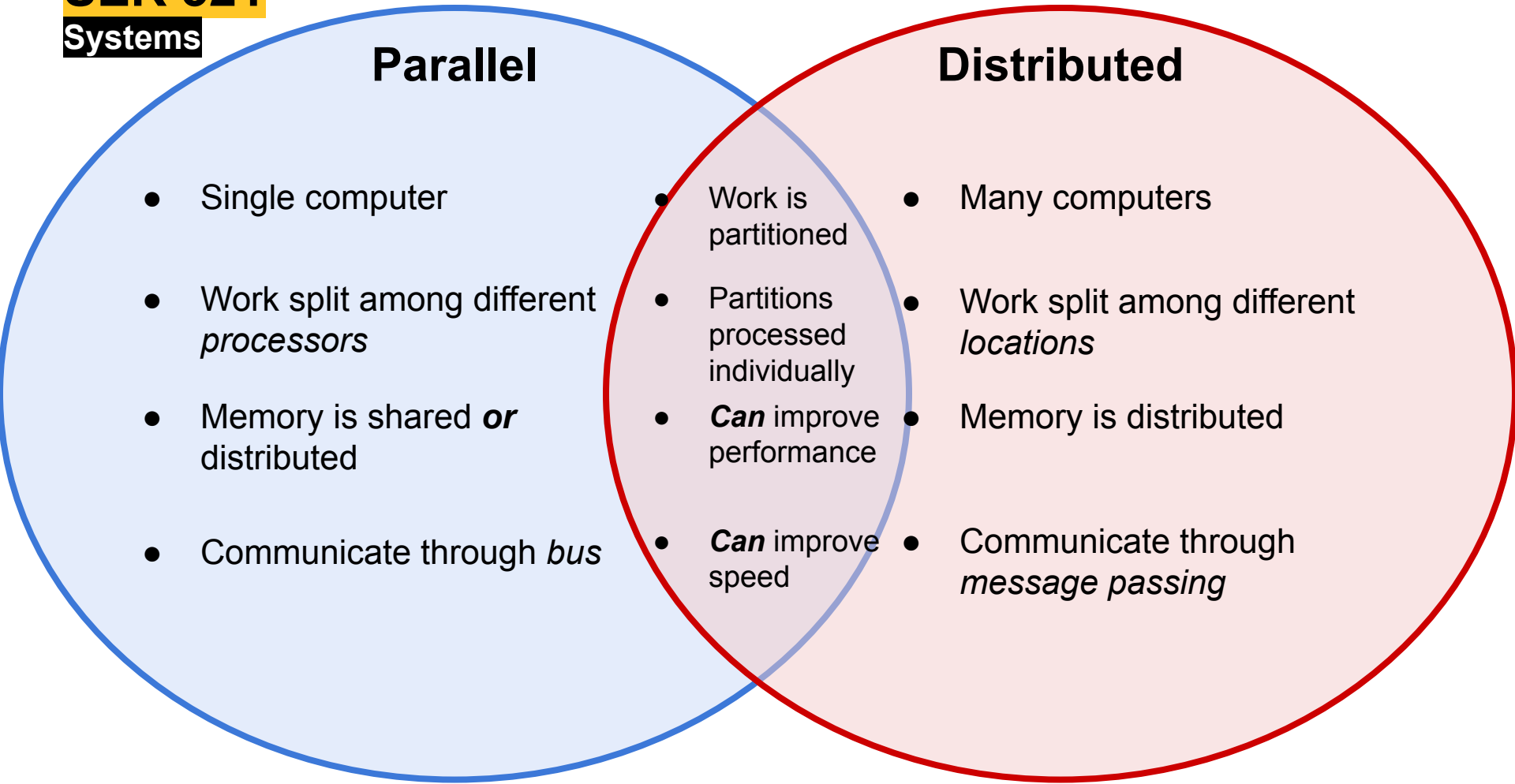
Object Stream

Java Objects

SER 321
Systems

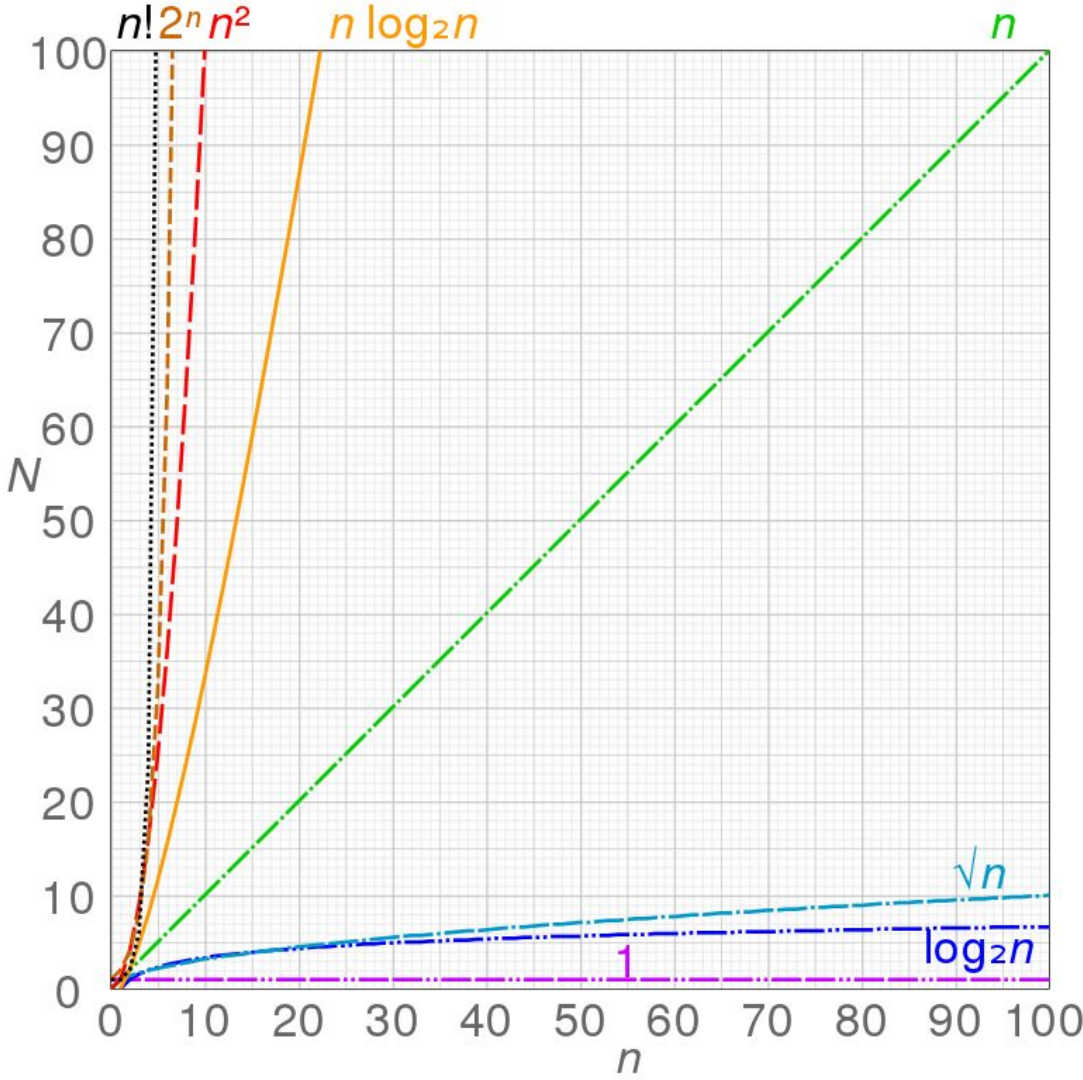


SER 321
Systems



SER 321
Distributed Systems

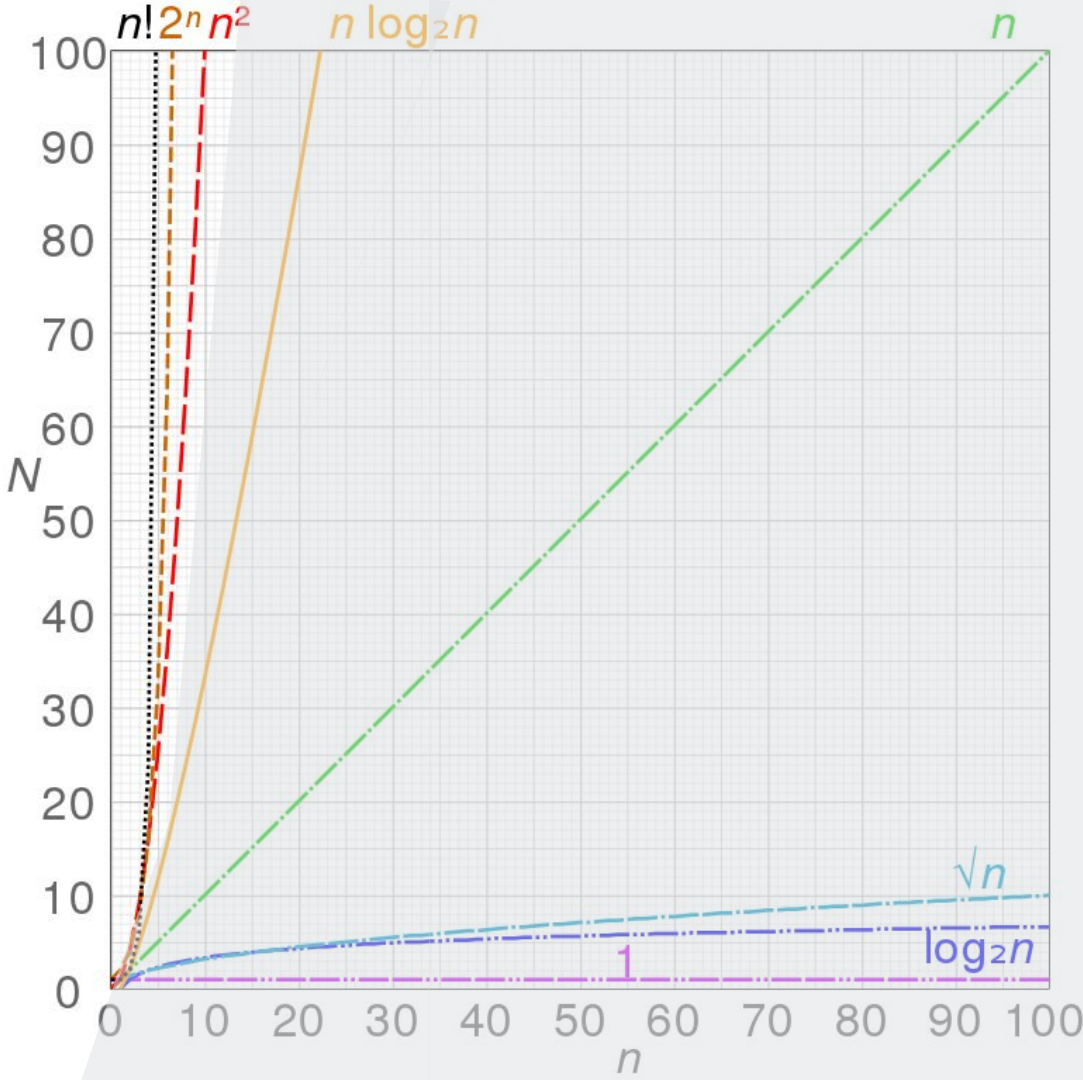
When should we *consider* distributing?



SER 321
Distributed Systems

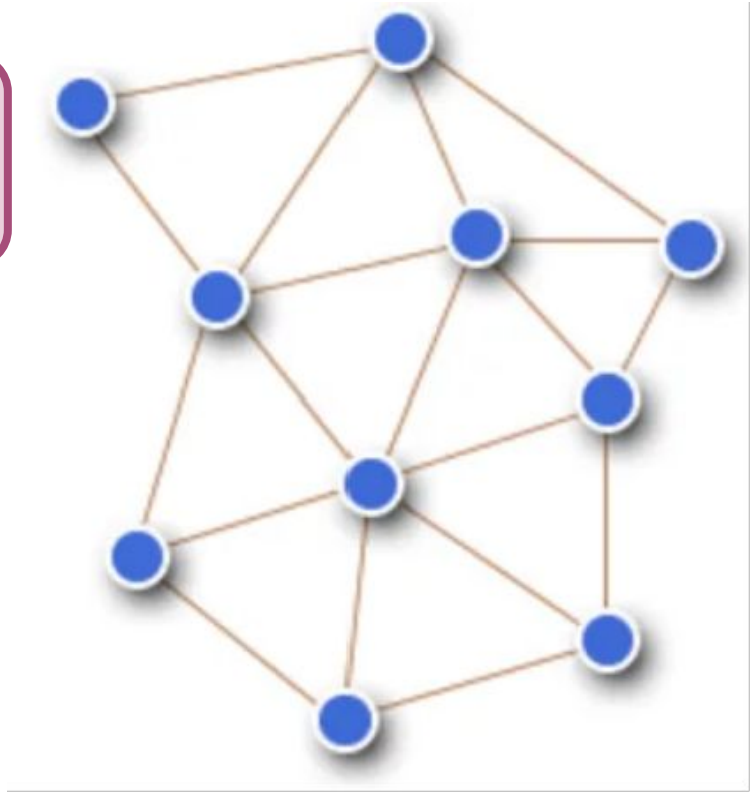
When should we *consider* distributing?

Super Duper Extra Extra Large Orders of Magnitude!



SER 321
Distributed Systems

Remember that we are operating in ***reality***

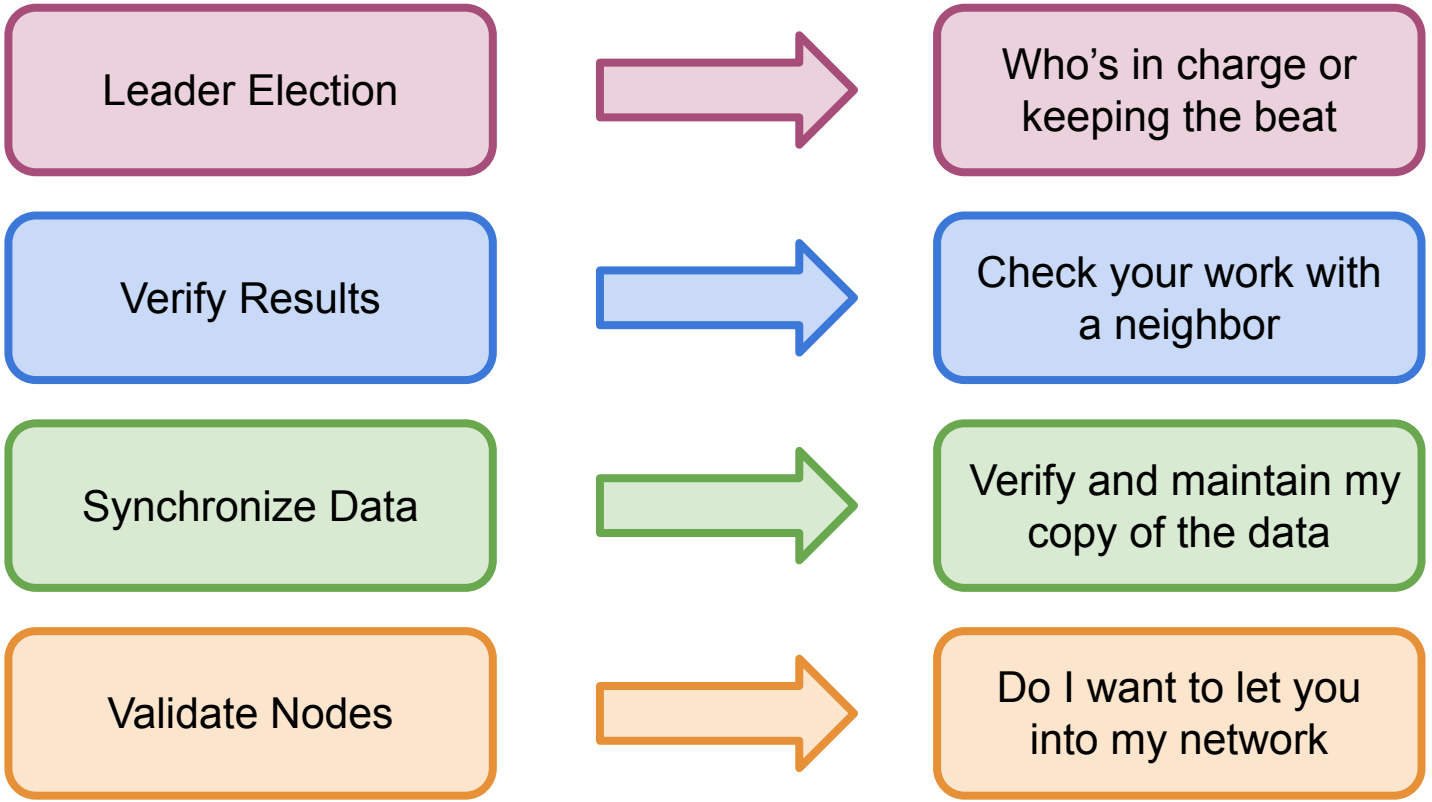


- Nodes *will* fail
- Web of nodes *will constantly* change
- Network is not *always* reliable
- Latency is *always present*
- The path traversed *changes*
- Some resources *must be shared*
- *You* need to prevent the pitfalls!
  - No deadlocks
  - No starvation
  - No error states

SER 321
Consensus

"General agreement or trust amongst a group"

Thoughts on usage?



SER 321
Middleware

We have been:

- Constructing (valid) Messages
- Serializing Messages
- Sending Message
- Handle Message

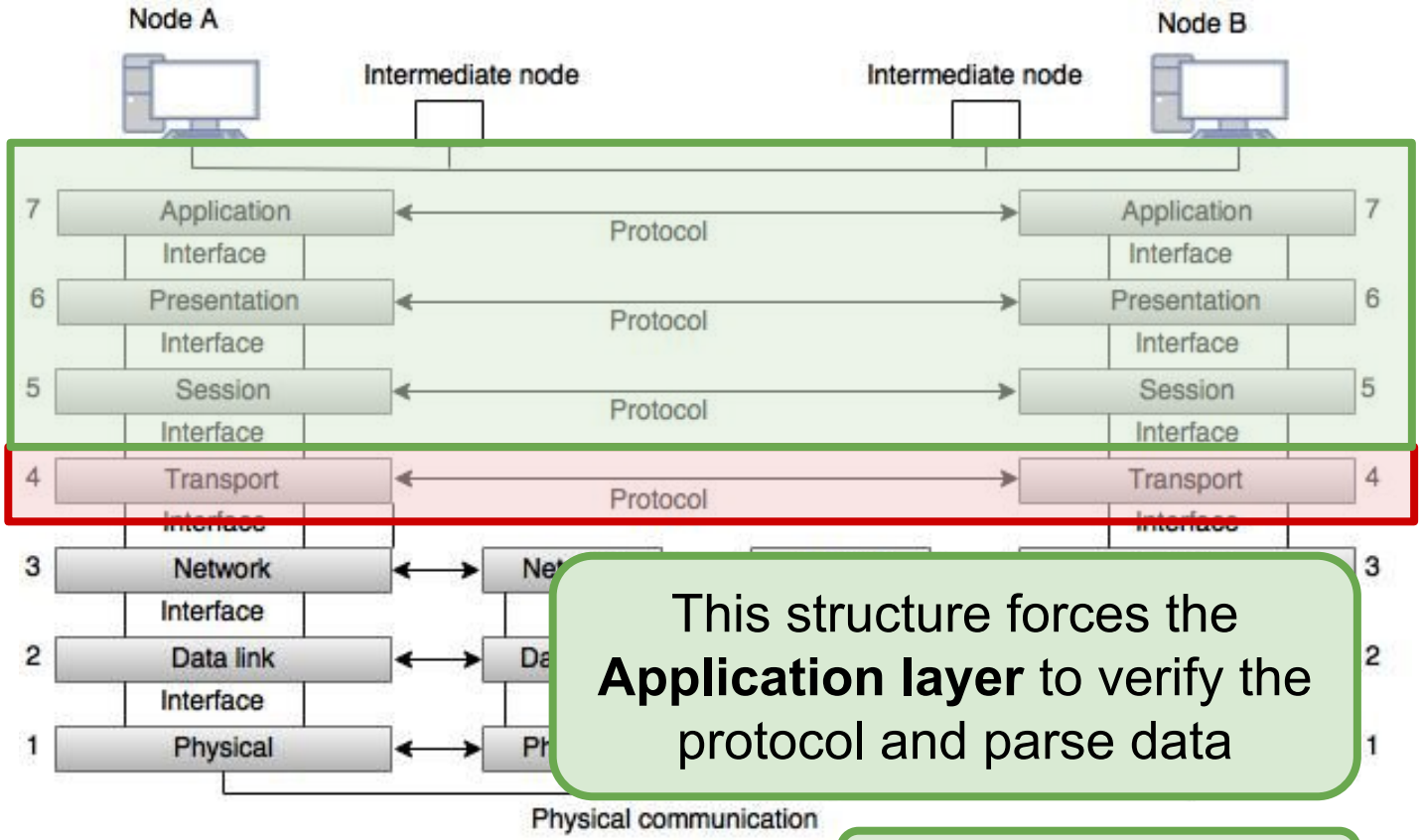


Fig: OSI Model

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

Not really its job…

SER 321
Middleware

Middleware:

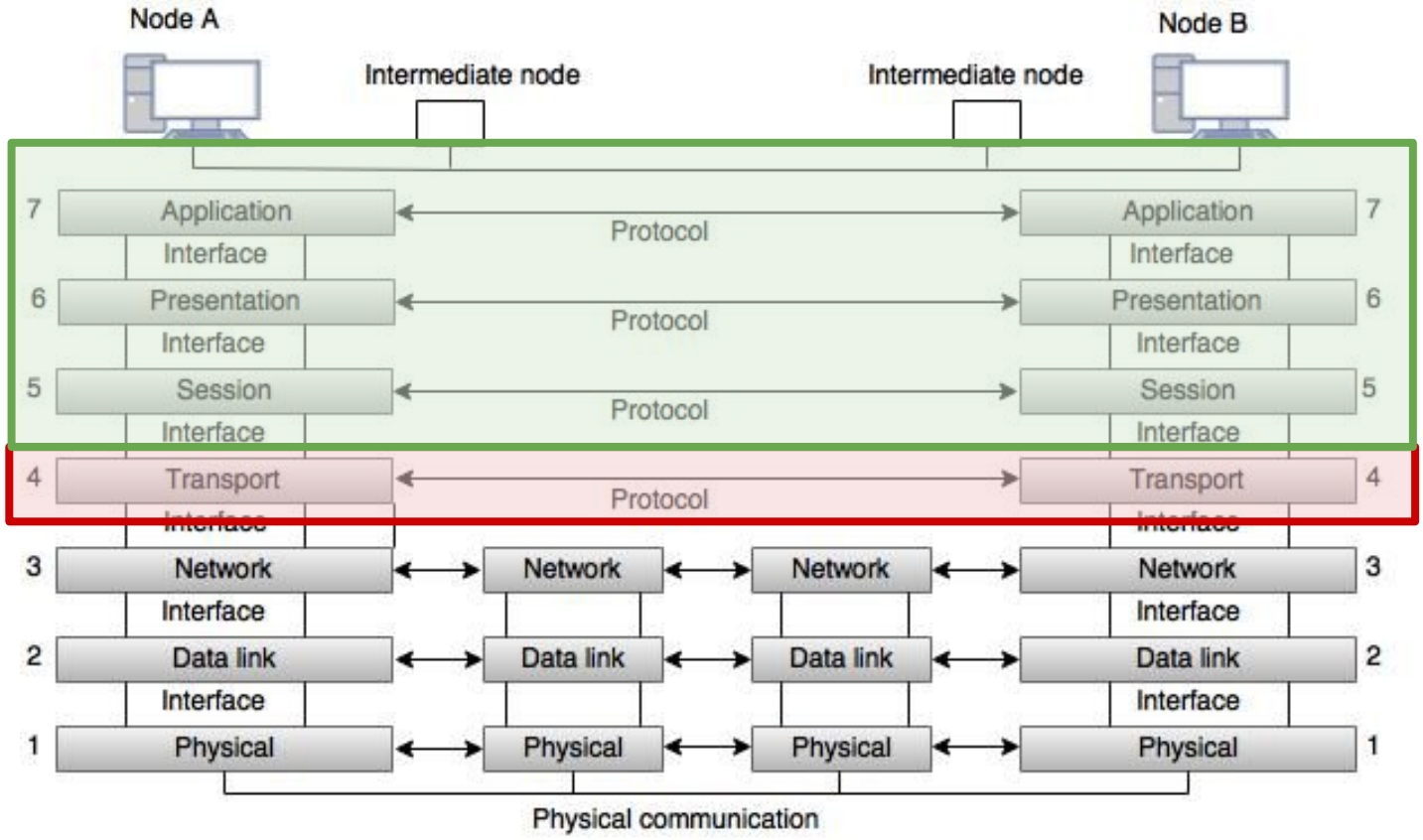


Fig: OSI Model

SER 321
Middleware

Middleware:

All that is handled *within* the middleware!

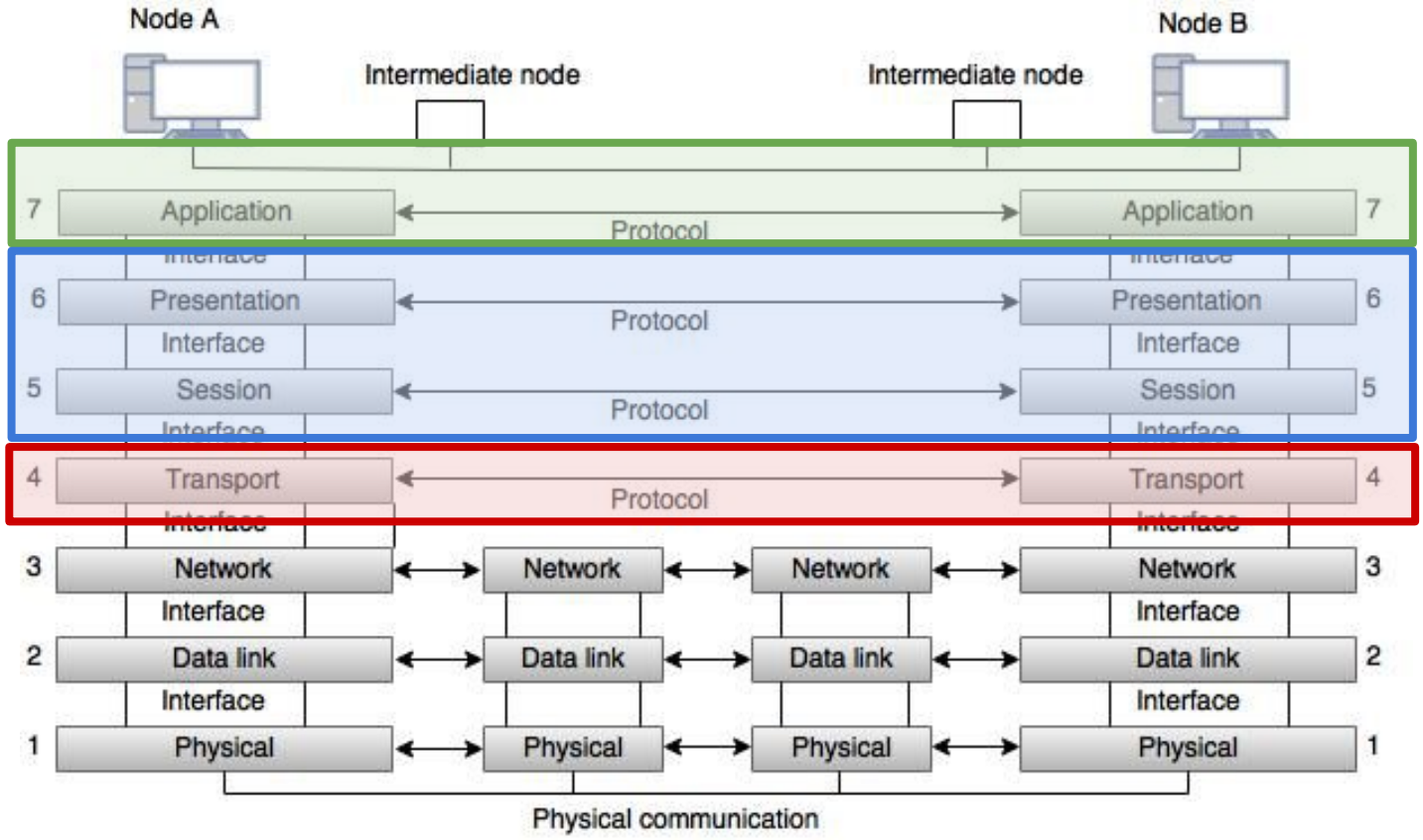


Fig: OSI Model

SER 321
Middleware

Middleware:

Session Layer Responsibilities:

Authentication

Authorization

Session Management

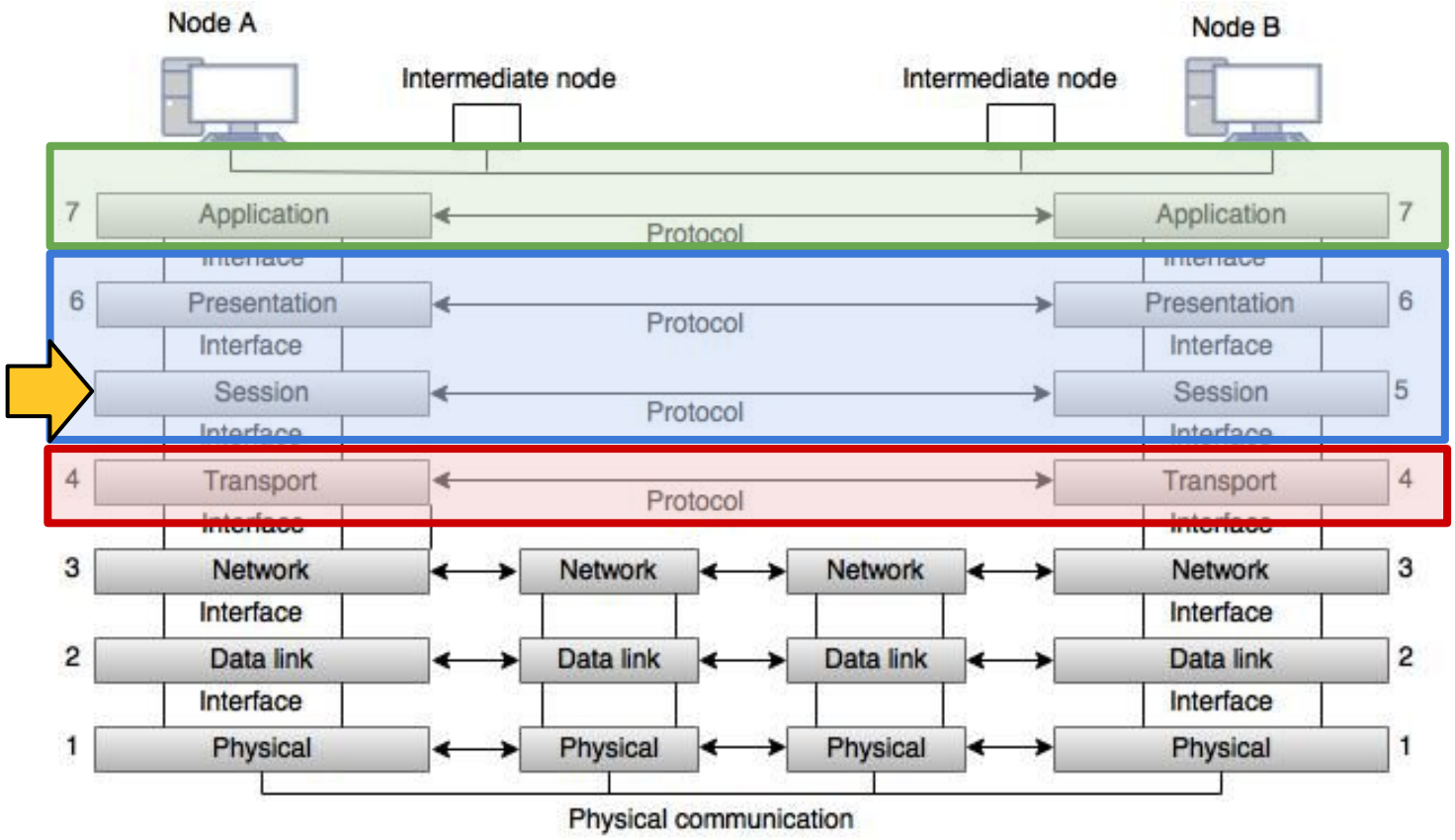


Fig: OSI Model

SER 321
Middleware

Middleware:

Presentation Layer Responsibilities:

Translation

Compression

Encryption

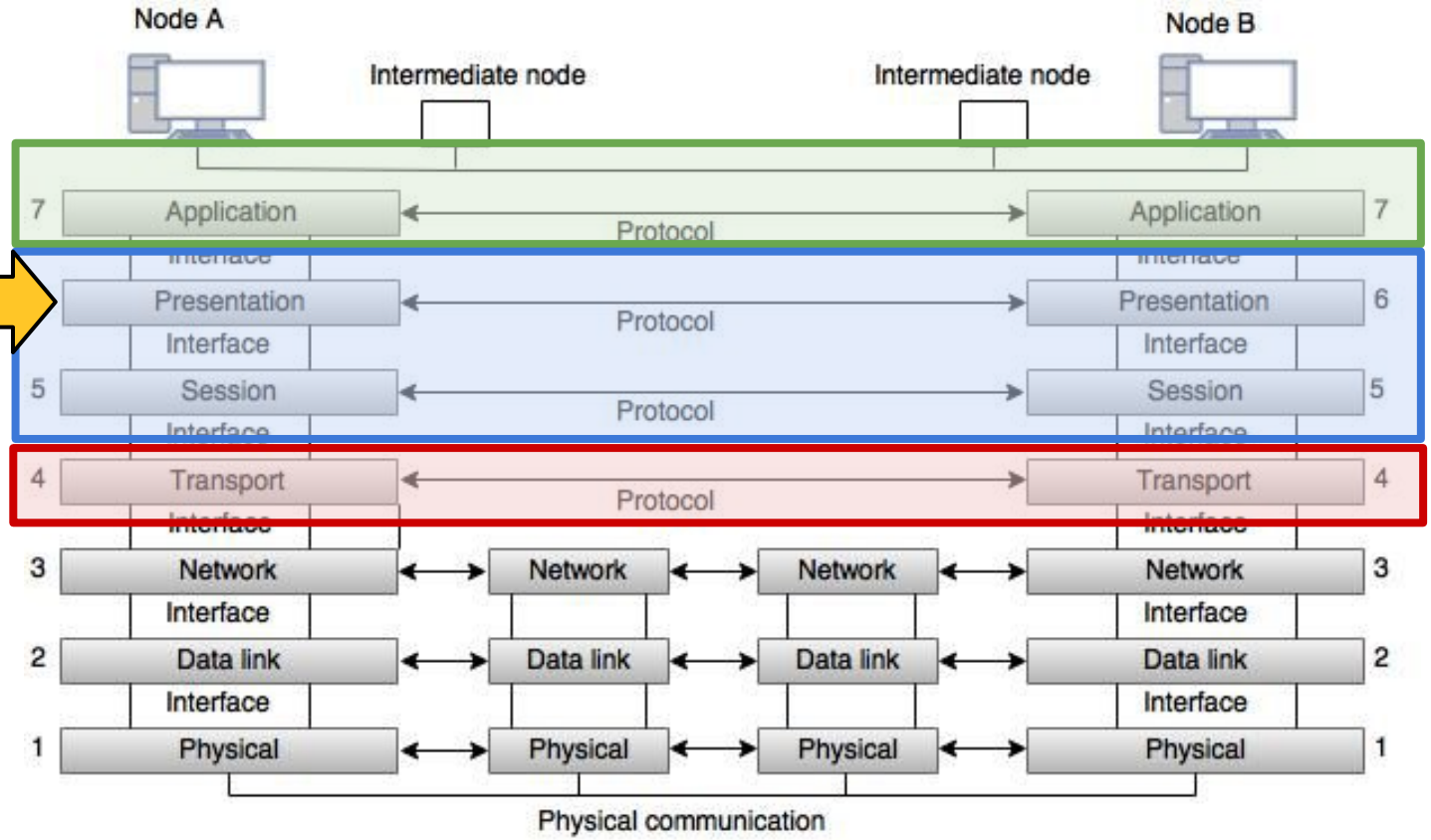


Fig: OSI Model

SER 321

Scratch Space

Questions?

Survey:

http://bit.ly/ASN2324

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Upcoming Events

SI Sessions:

- Monday, April 22nd at 7:00 pm MST - **Q&A SESSION**
- ~~*Thursday, April 25th at 7:00 pm MST*~~ **- CANCELLED**
- Sunday, April 28th at 7:00 pm MST

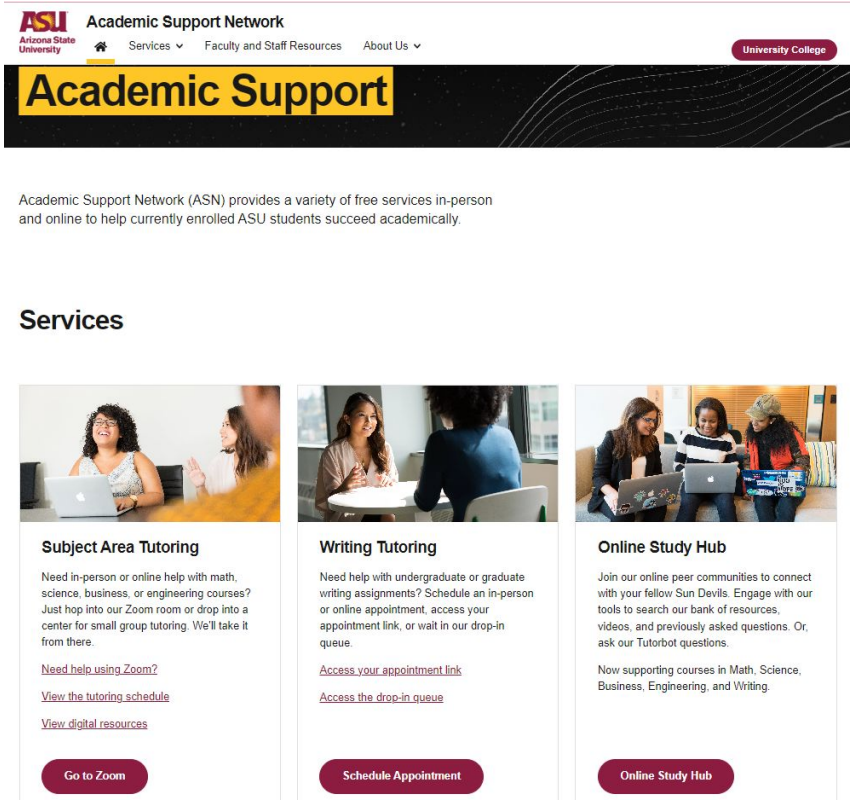
Review Sessions:

- This Session! 😁

More Questions?

Check out our other resources!

tutoring.asu.edu

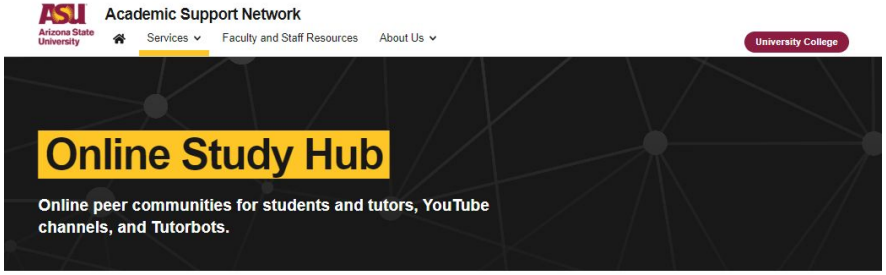


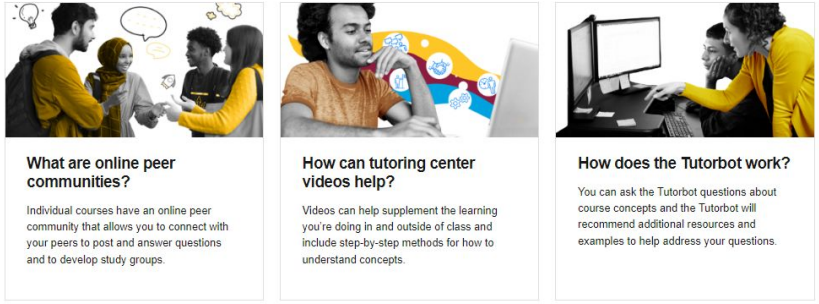
1. **Click on ‘Go to Zoom’ to log onto our Online Tutoring Center.**
2. **Click on ‘View the tutoring schedule’ to see when tutors are available for specific courses.**

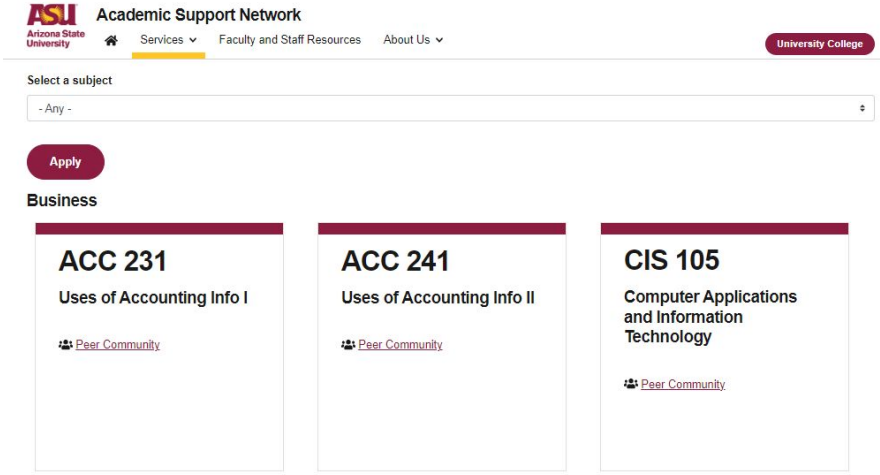
More Questions?

Check out our other resources!

tutoring.asu.edu/online-study-hub



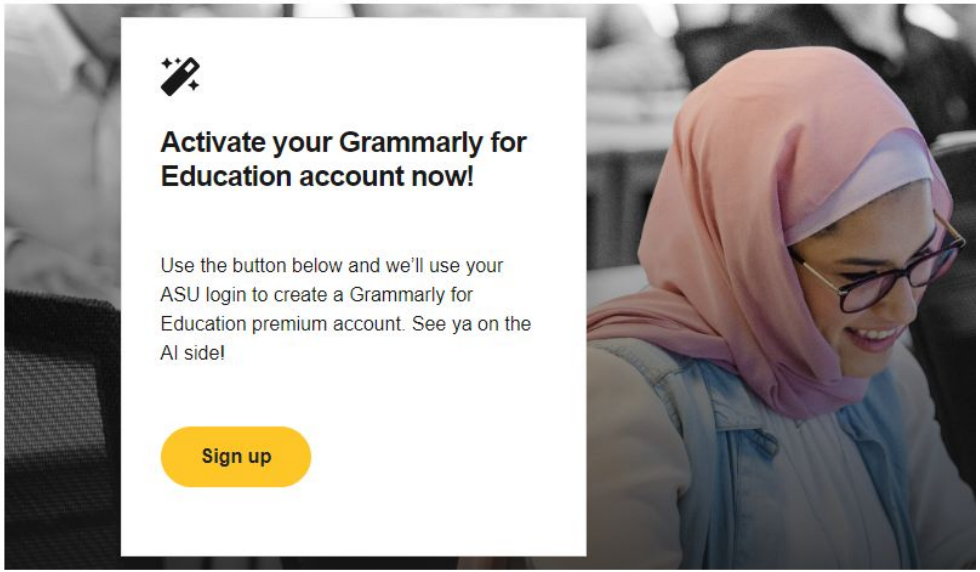




Don't forget to check out the Online Study Hub for additional resources!

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
- 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